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Leveraging Community Health Workers' Expertise in the Community to Address Food Insecurity in Appalachia

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LEVERAGING COMMUNITY HEALTH WORKERS' EXPERTISE IN THE COMMUNITY TO ADDRESS FOOD INSECURITY IN APPALACHIA

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Nutrition and Food Systems in the
College of Agriculture, Food and Environment
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By

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2022

ABSTRACT OF THESIS

LEVERAGING COMMUNITY HEALTH WORKERS' EXPERTISE IN THE COMMUNITY TO ADDRESS FOOD INSECURITY IN APPALACHIA

Residents of the Appalachian region of Kentucky are disproportionately affected by poor social determinants of health that contribute to the persistence of food insecurity and diet related diseases in this region. Poverty levels persist in rural areas of the Appalachian region while they improve throughout the rest of the United States. As this further perpetuates food insecurity in rural Appalachia, it is critical to identify culturally sensitive solutions to food insecurity. Utilizing Community Health Workers (CHWs), lay members of the community who have deep understanding of the communities they live in and serve, may be the answer to this problem. The purpose of this mixed-methods study is to describe the knowledge and cultural expertise of CHWs in rural Appalachia to better understand factors influencing food insecurity. Specifically, we aimed to identify successful, sustainable services as well as gaps in services that address food insecurity and diet quality where CHWs are uniquely poised to intervene. Characteristics, skills, and knowledge of CHWs related to nutrition needs were assessed through interviews, questionnaires, and a cultural competence assessment. This study demonstrated the importance of obtaining knowledge from CHWs in rural communities of Appalachia to address problems related to food security. As well as providing recommendations for future programs, grants, and policies focusing on reducing food insecurity in rural Appalachian communities. Implications for future research include training of CHWs on existing food assistance programs and integration of CHWs into medical teams.

KEYWORDS: [Community health workers, cultural competence assessment, Appalachia, food insecurity]

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CHAPTER ONE: INTRODUCTION

1.1 Background

The health of a population can be determined by the physical, built, or social environment, otherwise known as social determinants of health. Residents of the Appalachian portion of Kentucky know all too well the effects of poor social determinants of health. Some social determinants of health that are specific to the Appalachian region of Kentucky that increase morbidity and mortality are low income, high poverty rate, lack of access to affordable and nutritious foods, poor education, less opportunities for work, and lack of access to health care. Many of these contribute to food insecurity and the prevalence of diet related diseases in this region. As a result, individuals in the Appalachian region are at higher risk of developing obesity, cardiovascular disease, stroke, diabetes, and certain cancers. Food insecurity and poor diet quality are key social determinants of health that are associated with obesity and diet-related diseases. Compared to residents in urban and densely populated areas, rural residents in geographically isolated communities such as rural Appalachia, face a greater burden of food insecurity, hunger, poorer nutrition status, all of which are associated with higher rates of diet related chronic diseases.

The Appalachian region of Kentucky finds itself central to the Appalachian Mountain range in the peak of persistent poverty and economic distress. Challenges linked to the unique social determinants of health of the area, such as the lack of opportunity for economic advancement, access to affordable nutritious foods, and access to healthcare, present the need for individuals that can serve as intermediates between resources related to health and the community. Community Health Workers (CHWs) are

lay members of the community who have deep understanding and knowledge about the communities they live in and serve. The purpose of this study is to leverage the knowledge of CHWs in rural Appalachia to (1) better understand factors influencing food insecurity and nutrition deficits in the communities of focus; (2) identify successful, sustainable services as well as gaps in services that address food insecurity and diet quality; and (3) to assess characteristics, skills, and knowledge of CHWs related to nutrition needs that can inform the development of culturally relevant educational programs for CHWs strengthening their ability to effectively work within their communities to decrease food insecurity and to improve diet quality of community members.

1.2 Specific Aims

This thesis will address three specific aims:

Specific Aim 1: Explore economic and sociocultural factors related to access to food and dietary behaviors in Eastern Kentucky as they relate to services addressing food insecurity and diet quality in Eastern Kentucky.

Specific Aim 2: Identify existing, successful services to reduce food insecurity and improve diet quality as they relate to services in rural Appalachian communities of Eastern Kentucky.

Specific Aim 3: Identify characteristics, skills, and knowledge that CHWs have related to addressing nutrition needs of residents in rural Appalachia.

1.3 Significance

Leveraging the knowledge of CHWs may lead to effective solutions in reducing food insecurity and diet-related chronic disease in these communities. By identifying the key characteristics and existing strategies that community health workers use may provide information for enhancements to the existing curricula of community health workers. This thesis will collect knowledge from CHWs to develop a framework for identifying and enhancing existing interventions, identify agencies that need further support, and provide guidance regarding training of CHWs.

CHAPTER TWO: REVIEW OF LITERATURE

2.1 Rural Appalachia

Appalachia is a region in the Appalachian Mountains on the eastern coast of the U.S. This region includes 13 states, spanning from New York to Mississippi, making up 420 counties.[1] Overall, 25.7 million Americans live in the 205,000 square mile area that makes up the Appalachian Mountains.[1] Many counties in the Appalachia face economic challenges. Some common patterns observed in rural Appalachian counties across states are digital gaps, low education levels, high unemployment, inadequate housing, and high poverty rates.[1-3] The eastern portion of Kentucky finds itself central to the Appalachian Mountain range in the peak of persistent poverty and economic distress. This Appalachian portion of Kentucky makes up 54 of the 420 total counties. Recent census information has shown that there is a large gap between poverty levels and average income in the Appalachian region of Kentucky when compared to the rest of Kentucky and the United States as a whole. In 2019 the poverty rate of the United States was 10.5%.[4] In the non-Appalachian portion of Kentucky, the poverty rate was 18.9% and in the Appalachian portion it was 25.4% making Kentucky the state with the worst poverty in the region.[2] The average income in the United States in 2019 was $68,703.[4] In the non-Appalachian portion of Kentucky, the average income was less than half that at $30,777, and in the Appalachian portion it was just one third of the US average at $19,823.[2] The Appalachian Regional Commission (ARC) created an economic classification system using economic indicators such as a three-year average unemployment rate, per capita market income, and poverty rate.[5] Using this system Appalachian counties can be classified into five economic statuses: (1) Attainment: the economically strongest

counties; (2) Competitive: counties that are able to compete in the national economy but are not the highest 10%; (3) Transitional: counties that transition between strong and weak; (4) At-risk: counties that are at risk of becoming economically distressed; and (5) Distressed: counties that are the most economically depressed.[5] When looking at county economic status in Appalachia, the vast majority of the Appalachian counties in Kentucky are categorized as distressed. Compared to the United States as a whole, Kentucky's Appalachian counties rank in the worst 10 percent of the nation's most economically depressed counties.[6]

2.2 Food Insecurity in Appalachia

Food insecurity is defined as being without consistent reliable access to sufficient affordable and nutritious foods that are acquired in socially acceptable and safe ways in order to sustain an active, healthy lifestyle.[7] In 2019, 11.1% of individuals in the U.S. reported experiencing food insecurity at least one time during the year.[8] Overall, the rate of food insecurity in Kentucky is 14.8%.[8] In the counties of the Appalachian region of Kentucky food insecurity ranges from 13.3% at the lowest to 26.6% at the highest which is over double the national average.[8] Food insecure individuals often have poorer health outcomes. Food insecurity is associated with higher risk of obesity[9], cardiovascular risk factors[10], diabetes[10,11], hypertension[10], and poorer health in general.[12] Additionally, food insecurity is considered a risk factor for many of these health outcomes. Some reasons behind this relationship may be explained by looking into the food insecurity and obesity paradox. The food insecurity–obesity paradox spawns from the perplexing relationship between the lack of regular access to adequate food and an increased risk for obesity.[9] There are two prominent hypothesis that have been proposed to explain this paradox: (1)

this association occurs because high calorie, palatable food is consumed more often by food insecure populations, and (2) because of the limited knowledge, time, and resources that food insecure populations experience to engage in healthful eating and exercise.[13] The connection between high instances of food insecurity and diet related diseases in Appalachia demonstrates that there is a need for resources specific to this region that can work toward addressing food insecurity.

2.3 Social Determinants of Health

Social determinants of health are conditions of the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks.[14] It is important to look at social determinants of health to understand the context and cultural influences surrounding health in communities.[15] Important social determinants of health for consideration in the Appalachian region are the lack of opportunity for economic advancement, access to affordable nutritious foods, and access to healthcare.

Lack of Opportunity for Economic Advancement

In communities of the Appalachian region, lack of opportunity for economic advancement is more prevalent as more people experience higher instances of inadequate opportunities for secondary education, fewer opportunities for stable well-paying jobs, lower household income, and a higher unemployment rate. The 2017 Health Disparities report takes a comprehensive overview of health disparities in the Appalachian Region.[16] The median household income in the Appalachian region was 19% less than the national median.[16] This median was especially low in Central Appalachia at 38% less than the

national median.[16] The education status in counties in Appalachia also factors into the economic status.[16] Between 1990 and 2013 the Appalachian region as a whole increased the percentage of individuals with a high school diploma from 68.4% to 84.6%.[16] This increase left the Appalachian region only 1.3% below the national average of 85.9%.[16] Although central Appalachia had the largest increase from 52.1% to 75%, it still has the lowest percentage of individuals with a high school diploma in the region as a whole.[16] Additionally, only 57.1% of adults in Appalachia ages 25 to 44 have some type of secondary education, compared to 63.3% of the nation as a whole.[16] This is especially low in Central Appalachia at 46.7%.[16] Because this region has more barriers to obtaining education this can lead to fewer opportunities to make a living wage often resulting in lower household incomes, lower instances of having adequate health insurance, and higher likely hood of unemployment. Throughout Appalachia, the unemployment rate matches the national average of 5.4%.[17] The unemployment rate for working aged adults is highest in Central Appalachia at 7.3%.[17] This discrepancy highlights an issue at the heart of the Appalachian struggle, the region is habitually grouped into one entity, but the reality is that employment status can vary greatly from county to county. Nevertheless, "Bright Spots" do exist, and these outlier counties refer to an Appalachian County with better-than-expected health outcomes despite these region's socioeconomic characteristics.[16] There are nine counties in the Appalachian region of Kentucky that are Bright Spot communities.[16] Looking at what these communities are doing differently offers insight on how to improve health throughout this region.

Access to Affordable Nutritious Foods

Access to affordable nutritious foods in the Appalachian region of Kentucky is a challenge. Appalachian communities face food deserts, food insecurity, and reduced access to food assistance resources (WIC, food pantries, SNAP, etc.).

Food deserts are considered areas where people have limited access to a variety of healthy and affordable foods in their communities.[18] A study funded by the USDA found that areas with higher levels of poverty are more likely to be food deserts, and as rural areas experience population growth access to food is more likely to increase.[18] However, many rural communities in Appalachia are experiencing population decrease which leads to more strain on access to food.[17] Individuals living in a food desert may be forced to travel further to access food. Transportation has been identified as a major barrier to accessing food, especially in geographical areas categorized as food deserts.[19] When transportation is limited, this can add excess stress on community food assistance and emergency food programs.[19] Additionally, increased travel distance to grocery stores is linked to increased rates of obesity.[20,21]

Food insecurity is the lack of consistent reliable access to sufficient affordable nutritious food in order to sustain an active, healthy lifestyle, that can be obtained in a socially acceptable and safe way.[7] Challenges to food security identified by Appalachian residents include drastic changes in the community such as less people gardening and cooking due to a growing reliance on processed and fast foods.[15] Older adults are especially vulnerable to food insecurity which can lead to consequences such as chronic disease and not purchasing required medications due to high cost.[15] This demonstrates

that targeting food insecurity can not only benefit nutrition status, but also access to medical resources.

The Supplemental Nutrition Assistance Program (SNAP) serves households facing food insecurity. Data has shown that individuals in rural areas are more likely to participate in SNAP than in urban areas.[22] This may be due the unique barriers of rural Appalachia, such as high poverty rates, lack of access to transportation and nutritious affordable foods, to name a few. SNAP participation is higher in rural areas than in urban areas, with 16% of rural households participating compared to 13% of urban households.[23] Individuals participating in SNAP in rural areas are twice as likely to report experiencing food insecurity.[24] This demonstrates the increased need for funding of food assistance resources such as SNAP, WIC, food banks, backpack programs, etc., in rural areas, especially Appalachian communities.

Access to Healthcare

The Health Disparities report found that there are 12% fewer primary care physicians, 35% fewer mental health professionals, and 28% fewer specialty physicians per 100,000 residents in Appalachia compared to the U.S. overall.[16] This shortage of healthcare professionals in the Appalachian region is just one of many factors reducing access to care that can result in poor health outcomes. Individuals in this area are more likely to be uninsured due to the lack of economic opportunity, and those who have insurance are more likely to be enrolled in Medicaid or Medicare.[15] Therefore, individuals who are uninsured are more likely to utilize limited services offered by the local health department.[15] It is common for rural areas with smaller local health departments to be understaffed and underfunded.[25] The reliance on under resourced

health departments highlights the complexity of social determinants of health and health outcomes.

In a report among individuals residing in rural areas, 25% reported not having transportation to get to healthcare services.[26] Among the 25%, another quarter reported that this was due to the location of health services being too far or too difficult to get to.[26] A report released by the ARC found that in rural counties of Appalachia 8.4% of households do not have access to a vehicle which is higher than Appalachia overall at 7.3%.[17] Further, alternate modes of transportation, such as public transportation, are less common in these areas and distances to healthcare facilities, even local ones, is often further.[16]

2.4 Diet-Related Chronic Diseases in Appalachia

The leading causes of death in the U.S., including cardiovascular disease, cancer, and diabetes, can be linked to poor diet quality and other factors.[27] Obesity, and other diet-related chronic diseases such as cardiovascular disease, diabetes, and cancer are also more prevalent in the Appalachian region compared to the U.S. This is especially prominent in areas, such as Kentucky, that experience higher rates of economic depression. Leading a lifestyle that includes following a healthy dietary pattern and exercise can reduce one's risk for developing diet related chronic diseases.[28,29] In Central Appalachia, 33.8% of individuals report being physically inactive compared to the Appalachian region at 28.4% and the U.S. at 23.1%.[16] An increased risk for developing diet-related chronic diseases can be influenced by the unique social determinants of health that arise when living in rural areas.

Cardiovascular Disease & Hypertension

The leading cause of death in the U.S. is cardiovascular disease (CVD).[30] The mortality rate for CVD in Appalachia as a whole is 17% higher than the national rate.[16] Economically distressed counties within Appalachia have a CVD mortality rate that is 29% higher than non-distressed counties.[16] In Central Appalachia, where a vast majority of counties are categorized as distressed, the CVD mortality rate is 42% higher than the national rate.[16] Risk factors for CVD include hypertension, obesity, diabetes, and physical inactivity.[16] Evidence suggests that CVD can be prevented through consuming a healthy diet and engaging in regular physical activity.[31] A 2017 study done by Leibold and associates implemented the Complete Health Improvement Program (CHIP) in Appalachian Ohio to determine the effectiveness of this program in reducing CVD risk factors through diet and lifestyle changes.[32] This program was successful at short term reduction of CVD risk factors by preventing onset of hypertension and type 2 diabetes.[32] Although this intervention was short term, lasting only 4 to 8 weeks, and high intensity it demonstrates that having access to resources that increase access to fruits and vegetables, education on healthy eating, and physical activity is feasible and can be beneficial in improving health outcomes.

Obesity

Obesity is tied to many of the top causes of death in the United States. Currently, 42.4% of adults in the U.S. and 36.5% of adults in Kentucky are obese.[33] In the Appalachian region of Kentucky obesity varies from 33% to 48% by county.[34] Some common risk factors for developing obesity are: unhealthy diet, physical inactivity, genetics, social and economic issues, and stress.[35] Unique social determinants of health in

rural Appalachia can also lend themselves to higher rates of obesity in this region. These are things such as decreased access to healthful foods, marketing of unhealthful foods by the food industry, and reduced opportunity for physical activity through the built environment, which can contribute to higher rates of obesity.[16] Another possible reason why the prevalence of obesity is higher in this region could stem from misconceptions about these diet-related diseases. For example, Appalachian residents were less likely to associate poor health behaviors with increased risk for obesity than their non-Appalachian counterparts.[36] There is opportunity for health education that focuses on the etiologies of diet-related chronic diseases.

Diabetes

The prevalence of diabetes is also higher in the Appalachian region. In 2017 the rate of diabetes in central Appalachia was 13.5%, compared to the national average at the time of 9.8%.[16] Central Appalachia had the highest diabetes mortality rate of 30.4% which was 41% higher than the national average of 21.5%.[16] In some of the distressed counties of Appalachia, 1 in 5 adults aged 45 to 64 have diabetes.[37] Some of the risk factors for diabetes include older age, obesity, family history of diabetes, and physical inactivity.[16] Some social determinants of health that interfered with individuals of the community receiving effective diabetes care include the lack of access to providers, transportation, and high rates of food insecurity, housing insecurity, and financial insecurity.[38] Misconceptions about diet-related diseases could also be a factor in higher prevalence of diabetes in this region as well. In Appalachia, knowledge about diabetes risk is low and people are generally unsure about what precipitated their diagnosis of diabetes, stating that it cannot be "prevented" or "it's not your fault".[39] Similar beliefs

among individuals with diabetes in this region include feeling predestined to develop diabetes and being unaware that there are behaviors that can help prevent and lower risk for developing diabetes.[38] Health behaviors are not seen as a risk factor for diet-related chronic diseases in the Appalachian region.[36] Again, this presents an opportunity for nutrition and health education.

Cancer

Cancer is the second leading cause of death in the U.S..[30] Diet and healthy lifestyle can play a big part in preventing the development of cancer, aid in the recovery from cancer, and even help prevent it from recurring. The prevalence of cancer is also higher in the Appalachian region than the national average. Overall mortality from cancer in the Appalachian region is 10% higher than the national rate.[16] In areas of Appalachia that are economically distressed cancer mortality rate is 20% higher than its non-distressed counties.[16] In Kentucky specifically, cancer mortality rate exceeds the national average by 35%.[16] Cancer mortality rate is often higher in Kentucky and Appalachia because they have greater exposure to behavioral (e.g. diet and exercise) risk factors, environmental (e.g. water and air pollution) risk factors, and limited access to early screening and treatment.[16] Cancer patients in rural Appalachia had significantly lower survival rates than urban non-Appalachian patients.[40] Lack of knowledge and negative beliefs about cancer in these areas may be contributing to high mortality rates. Negative beliefs are also a barrier to improving health outcomes because beliefs are precursors to the behavior's individuals are willing to engage in. Among 1891 Appalachian residents, 71% agreed with the statement that "everything causes cancer," 81% agreed with the statement that "there are too many cancer prevention recommendations to know which

ones to follow," and 72% agreed that "when they think of cancer they automatically think death".[41] To decrease cancer mortality rates Appalachia, education on causes and prevention of cancer may also influence beliefs that will encourage seeking resources including early screening.

2.5 Community Health Workers

Community Health Workers (CHWs) are lay members of the community who work with local health care systems and health departments to reduce health disparities in underserved communities.[42] CHWs go by many titles including lay health advisors, promotoras(es), para-professionals, community-based educators, outreach workers, health navigators, outreach educators, peer health promotors, and community health advisors.[42,43] They are often described as indigenous members residing in the community that have a close understanding or share the ethnicity, language, socioeconomic status, and life experiences of the community.[42,44] Some common characteristics of CHWs are that they are: culturally competent[45], understand underlying reasons people from their community may make health-related behavior change[45], serve as role models[45,46], can effectively provide nutrition education with adequate training[47], have knowledge of the community they serve, have the same life experience and demographics of the community[46], and are trusted members of their community.[46] Some common roles of CHWs are to build trust, offer in person help such as interpretation and translation services, navigate the health care system, provide culturally appropriate health education, give informal counseling, and connect individuals to community resources.[42,48] Since CHWs have such a close relationship with the community they work with they are able to reach community residents where they live, eat, play, work, and worship.[42]

CHWs can serve as outreach experts in their communities in order to target social determinants of health that negatively affect these communities in rural Appalachia. Not only are they able to strengthen already existing ties with community programs, but they educate health care providers and administrators on the cultural relevancy of health interventions.[49] Working with CHWs to understand the needs of their communities is key in identifying and developing effective solutions to reduce food insecurities in this region.

2.6 Community Health Workers and Cultural Competence

Cultural competence and sensitivity are defined by Horvat and associates as "a set of congruent behaviors, attitudes, and policies that come together in a system, agency, or among professionals that enables effective work in cross-cultural situations."[50] Cultural competence is now an education issue that is applicable to all healthcare professionals to ensure that they are providing care that is equitable, effective, and culturally appropriate.[50] In rural areas such as Appalachia healthcare workforce shortage is common and most healthcare professionals have immigrated to these rural areas to work meaning that they have low cultural competence. Because it is anticipated that a CHW is from the community they work with, cultural competence and sensitivity are expected to be adequate among CHWs. This highlights the opportunity for CHWs to relay culturally sensitive health education to clients or cultural competence education to the health professionals. Integration of CHWs into the health care delivery team has shown to improve community members perceptions to engagement in care and adherence to appointments.[49,51] There is limited research on CHWs working with health care teams to relay culturally competent information, but one study attempted to identify health

professionals' perceptions of CHW effectiveness on the health care team. This study identified that 47% of health care professionals and staff agreed or strongly agreed that utilizing CHWs would be helpful for reducing health care disparities.[52] Some qualities that increase willingness to use outreach approaches, such as CHWs, to improve healthcare delivery for underserved populations are cultural motivation, already displaying culturally competent behaviors, cultural preparedness, and cultural humility.[52]

2.7 Requirements and Training of Community Health Workers

Community health workers are not employed or trained by any one organization. Rather, there are many types of organizations, agencies, and companies that vary in size and training emphasis.[53] Level of support for CHW programs also vary by state with some having legislation that requires the employment of CHWs and others having little to no state support.[53] Some of the organizations that CHWs can be employed by include health departments, federally qualified health centers, nonprofit organizations, and universities.[54] Requirements for becoming a CHW also vary by state and organization. In the Appalachian region of Kentucky, CHWs are employed by the Kentucky Homeplace which is part of the University of Kentucky's Center for Excellence in Rural Health.[55] CHWs can receive official certification through the Kentucky Office of Community Health Workers (KOCHW). Requirements include currently living in Kentucky and/or being employed as a CHW in Kentucky, being a legal U.S. resident, at least 18 years old, having a high school diploma, and demonstrating core competencies through completion of qualified training.[54] Through KOCHW, certified CHWs are required to complete continuing education units each year to uphold their certification.[54] Training opportunities are provided by the Kentucky Homeplace and KOCHW. In West Virginia,

training for CHWs is offered through the School of Osteopathic Medicine's Center for Rural and Community Health. Their Community Health Education Resource Program (CHERP) offers training for CHWs on wellness, health promotion, and disease prevention management.[56] Requirements to become a CHW in West Virginia include being 18 years of age and having a high school diploma.[56]

2.8 Community Health Workers Addressing Food Related Issues

Due to the close relationship between CHWs and their communities they are able to reach their communities on levels that normal health practitioners would not. Because CHWs are generally trusted more by the community than health professionals and have a greater understanding of their unique challenges, this presents the opportunity for using CHWs to relay culturally sensitive nutrition and health education.[49] Studies have found CHWs to be effective in chronic disease prevention and maintenance[57], diabetes education[58], and connecting food insecure individuals to existing programs in the community.[49] In a study by Feltner and associates (2016) researchers utilized CHWs in the research process and found that CHWs can also offer research support in rural settings.[58] Rural areas are typically more challenging to gather data due to barriers such as lack of means to maintain contact, inadequate transportation, and reluctance to keep appointments with unknown research personnel.[58] CHW's often share a community background or shared culture which allows them to secure participation in health studies, increase adherence to study protocols, and decrease the likelihood of withdrawal from the study.[58] CHWs are also able to overcome challenges associated with low literacy that often affects health education such as diabetes education from a healthcare provider.[58] Utilizing the CHWs to provide culturally sensitive diabetes education can lead to a longer

lasting effect on decreasing A1C levels of participants.[58] Integrating CHWs into multidisciplinary teams in rural areas may be a cost-effective solution to reduce rates of diet-related chronic diseases. Because CHWs serve as a link between health/social services in the community they can also be utilized to connect individuals to existing programs in their community.[49] This in turn allows CHWs to be a vehicle for reducing food insecurity in Appalachian communities. However, there is limited research on CHWs and food insecurity.

2.9 Gap in Literature

There is limited evidence on the characteristics, skills, and knowledge of CHWs as it relates to their effectiveness in addressing nutrition needs in the Appalachian community. Practices of CHWs vary by region, intervention type, and needs of the community. Consistent reporting on strategies employed to do assessments will provide information on feasibility of tools that can be used to develop health interventions. Second, there is limited research on the resources and training that CHWs receive to work with communities. Such as nutrition, food insecurity, or chronic disease management education. Third, there is little research on what community programs CHWs use to address food insecurity such as the back pack program, food banks, WIC, SNAP, or even more community-based strategies such as church dinners and food pantries. By understanding strategies and practices of CHWs a framework for identifying and enhancing effective practices can be leverage to further support efforts in improving health in the Appalachian community.

2.10 Gutschall's Rural Nutrition Care Model

The Rural Nutrition Care Model (RNCM) identifies specific factors that affect food choices and nutrition care in rural Appalachian communities.[59] This model was created to accurately reflect the realities of rural patients in order to train dietetic interns on how to provide culturally competent care to this population.[59] The four main themes of this model are (1) access and resources, (2) sociocultural characteristics, (3) traditional foods, and (4) health behaviors. The access and resource's theme encapsulates unique barriers to access in this population. The sociocultural characteristics theme identifies unique sociocultural influences on dietary knowledge and food choices in this population. The traditional food's theme focuses on aspects of rural culture that strongly influence food traditions in this population. Finally, the health behavior's theme includes attitudes toward and the practice of certain behaviors that affect health in this population. This thesis addresses CHW's roles in addressing the needs of rural Appalachian communities which hasn't been looked at in the context of this model.

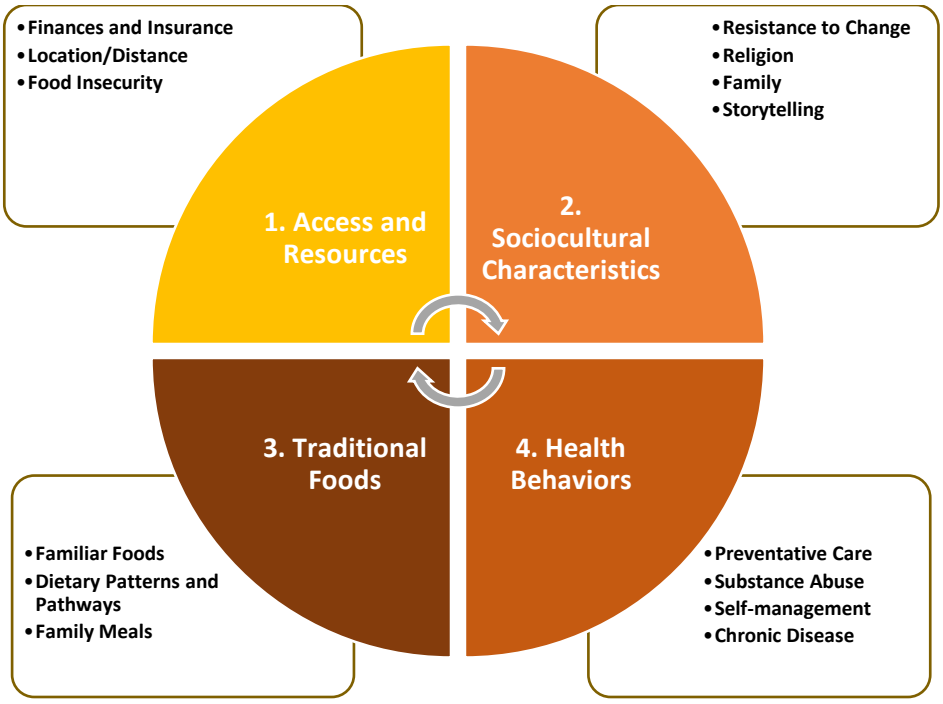

Figure 2.1 Rural Health Recreation of the Nutrition Care Model created by Gutschall et al. Addressing Health Disparities in Rural Nutrition Practice

CHAPTER THREE: METHODS

3.1 Research Design

The study design was approved by the University of Kentucky Institutional Review Board before the start of the project (**Appendix A**). This study used a cross-sectional mixed methods approach that utilized online surveys and in-depth phone interviews to leverage the knowledge of CHWs in the Appalachian region.

3.2 Setting

This study targeted the Appalachian region and the population for this study were Community Health Workers serving this region.

3.3 Sample

A convenience sample of CHWs were recruited through the CHW network to complete the online survey and an in-depth interview. Eligibility criteria of CHWs includes English speaking, holding a position of CHW, having at least 12 months of experience in their role of CHW, self-identify as a native resident of Appalachia, and self-report that they primarily work with adults in their CHW role. Exclusion criteria includes not self-identifying as a native resident of Appalachia, and self-reporting that they primarily work with children in their role as a CHW.

3.4 Participant Recruitment

A sample of CHWs was recruited through a network of CHWs located in Rural Appalachia. A recruitment email with a link to the questionnaire was sent from the director of the network (**Appendix B**). A follow-up email was sent a week later as a

reminder to increase participation in the study. Every participant who completed the online questionnaire received a $50 gift card as an incentive. At the end of the questionnaire participants were prompted to leave their contact information if they were interested in completing an additional in-depth interview. These participants were then contacted to set up an interview. Participants received an additional $75 gift card for completing the interview. The informed consent waiver is included in **Appendix C**.

3.5 Procedures

Recruitment and data collection began on January 23, 2019 and ended in May of 2019. A link to the questionnaire was included in the recruitment email sent from the director of the CHW network. When participants clicked the link, it immediately prompted them to fill out a waiver of informed consent before completing the online questionnaire. After completing the questionnaire, participants were invited to leave their contact information if they were interested in completing an additional semi-structured in-depth interview with 31 possible questions. These comprehensive, cognitive interviews were guided by the Rural Health Nutrition Care Model[59]. Interested participants were contacted to set up a time and were provided with an additional waiver of informed consent before completing the interview. At the time of participants' choosing, interviews were held over the phone and audio recorded. The interview process varied in length and lasted between 41 and 54 minutes. The audio recordings were stored on a university approved computer until written transcripts were developed. Recordings were then destroyed to protect the identity of the interviewee. This computer is only accessible to the primary researchers and members of the research team. The procedures for obtaining qualitative and quantitative data can be seen in **Table 3.1** below.

Table 3.1 Procedures for obtaining qualitative and quantitative data

Number	Step	Data Collected
I	UK IRB Approval	
II	Participant Recruitment	
1	Eligibility	a. English speaking b. CHW position c. ≥ 12 months experience in CHW role d. Self-identify as a native resident of Appalachia e. Primarily work with adults
2	Online Questionnaire	a. Signed consent b. 71-Item questionnaire Cultural competence Childhood SES Personal experience Knowledge & referrals to food assistance programs Sleep assessment Training & Experience Client/patient perceptions Demographics c. Incentive administration
3	In-depth Interview	a. Signed consent b. 31-Question interview Interviews held over the phone c. Incentive administration

3.6 Instruments

The study used two instruments. First, the online questionnaire and next the in-depth interview question guide.

Questionnaire

This study used the Cultural Competence Survey (**Appendix D**). This validated survey was designed to explore participant's knowledge, feelings, and actions when interacting with others in the context of health care and health service environments.[60-62]

Items 6 through 30 make up the Cultural Competence Assessment (CCA) tool which is used to measure cultural awareness and sensitivity (CAS) and culturally competent behaviors (CCB) of CHWs. The survey also included items related to demographic and professional specific data including years of experience as a community health worker, areas of expertise and training (e.g., diabetes prevention, mental health, leading disease-specific support groups, non-pharmacological treatments for chronic illness, etc.), and identifying other underserved communities (e.g., Hispanic/Latino, African Americans, older adults, youth mothers, etc.) in Appalachia.[60-62] Item responses were assessed on a 7-point Likert scale ranging from "strongly agree" to "strongly disagree" when measuring attitudes and beliefs, and from "always" to "never" when measuring frequency of behaviors. Qualtrics was used to disseminate the online questionnaire. This 71-item questionnaire addressed cultural competency (n=25), childhood socioeconomic status (n=3), personal experience (n=7), knowledge and referrals to food assistance programs (n=9), sleep assessment of clients (n=7) (data not analyzed for this study), type of training and experience (n=10), client/patient perceptions (n=6), and demographics (n=4). Items for this survey were adapted from several sources.[60-62]

Interview

The semi-structured in-depth interview, **Appendix E**, consisted of 31 possible questions that were guided by the Rural Health Nutrition care model that addresses factors related to access and resources, sociocultural characteristics, traditional foods, and health behaviors.[59] Questions were asked to elicit information relative to existing program-related solutions, gaps, and health and nutrition-related needs of the community.

3.7 Analysis

Specific questions that were analyzed from both the questionnaire and the interview can be seen in **Table 2** below.

Table 3.2 Research objectives, research questions/specific aims, and corresponding questionnaire and interview questions.

Research objectives	Research Questions/ Specific Aims	Questionnaire Questions	Interview Questions
1. To better understand factors influencing food insecurity and nutrition deficits in the communities of focus.	1. Explore economic and sociocultural factors related to access to food and dietary behaviors in Eastern Kentucky as they relate to services addressing food insecurity and diet quality in Eastern Kentucky.	(Q44) Which population(s) of people do you encounter during your work that do not have resources? Check all that apply. (Q45) Among the population(s) of people you selected, which do you believe has the most urgent needs? (Q25) For each of the following statements, select the option that best describes how you feel about the statement: (Q25_2) There is a negative stigma associated with visiting the food pantry in the areas my clients reside; (Q25_3) The stigma associated with visiting the food pantry prevents my clients from using it to obtain food. (Q1) In the past 12 months which of the following special population groups have you encountered among your clients and their families or within the health care environment or workplace? (Q2) In your current environment what	1. What if any barriers can you identify regarding providing food and nutrition for your clients? 2. Can individuals affordably and efficiently get to where they need to be? 3. What are some examples of challenges you face when trying to address hunger with families? Prompt: Are there some examples from families who you were not able to help and why were you not able to help them? 4. Are healthy products available and affordable in your community? 5. What influences the food choices of your clients?

				percentage of the total population is made up of people from these special population groups? *Write in percent; may not total 100%* (Q46) Which of the following are health concerns among the people you serve? Check all that apply.	
2.	To identify successful, sustainable services as well as gaps in services that address food insecurity and diet quality.	2.	Identify existing, successful services to reduce food insecurity and improve diet quality as they relate to services in rural Appalachian communities of Eastern Kentucky.		6. When a family is in need of food, what are some resources to obtain foods? 7. What is an example of a solution to hunger or food insecurity that you have seen your clients use to solve their own or other's? 8. What skills, knowledge or techniques do you believe your clients would benefit from learning or practicing to reduce food insecurity and hunger? 9. What is an example of a change that a client or family has made to improve their access to food? 10. Have you noticed if people in your community have gardens where they live? Follow up: What types of foods/plants do people garden? 11. When a family is in need of food, what are some ways that their family, friends or neighbors help**?**
3.	To assess characteristics, skills, and knowledge of CHWs related to nutrition needs that can inform the development	3.	Identify characteristics, skills, and knowledge that CHWs have related to addressing nutrition needs of residents in	Cultural Awareness Subscale (CAS) including items 6-16. Cultural Competence Behavior (CCB) subscale including items 17-30.	

of culturally relevant educational programs for CHWs strengthening their ability to effectively work within their communities to decrease food insecurity and to improve diet quality of community members.	rural Appalachia.	(Q21) Do you have another paid job besides being a Community Health Worker? (Q24/25) Select the option that best describes your level of knowledge to refer families to following food assistance programs.

Questionnaire

The data collected in the questionnaires was used to meet specific aim 3, which involves laying the ground work for improvements to be made to the CHW's curriculum in order to better equip them and increase their effectiveness in dealing with the problems in Eastern Kentucky and addressing nutrition needs of this community. Statistical analysis of the questionnaires included summarizing categorical variables (race, education level, food assistance questions, etc.) with counts and percentages and continuous variables (scores calculated from validated surveys) with descriptive statistics (n, mean, standard deviation). For descriptive statistics, education levels were collapsed into smaller categories. Selecting "diploma" and "high school or GED" was recoded as having a high school degree, selecting "associates degree" was recoded as having some college, and selecting "bachelor's degree" or "graduate or professional degree" was recoded as being a college graduate. For scaled questions, categories such as "very often" and "somewhat often" were recoded as "somewhat/very often", and "sometimes" and

"few times" were recoded as "sometimes/few times." To assess the CAS subscale, items 6, 7, 10, and 13 first needed to be reverse coded. Then item codes for 6 through 16 were added up and divided by number of items to identify the individual CAS subscale score. A larger score means greater awareness and sensitivity. To assess the CCB subscale, item codes for 17 through 30 were added up and divided by number of items to identify the individual CCB subscale score. A larger number means greater cultural competence behaviors were demonstrated. When assessing Cronbach's alpha, we found that interrater reliability of two items, race and culture, were lowering the score so items 6 and 7 were removed from the CAS subscale to get a Cronbach's alpha score that was > 0.8. Questions regarding childhood socioeconomic status were analyzed using methods developed by Hill and associates.[63] Further structured questions were refined through qualitative analysis to identify solutions, stakeholders, resources/lack of resources, and resilient solutions in which food insecurity is addressed without stigmatism along with potential further needs that appear in the community.

Interview

The data collected in the interviews will be used to meet specific aim 1, to explore economic and sociocultural factors related to access to food and dietary behaviors in Eastern Kentucky as well as gaps in services addressing food insecurity and diet quality, and specific aim 2, to identify existing successful services to reduce food insecurity and improve diet quality as well as gaps in service in rural Appalachian communities of Eastern Kentucky. Coding of the data into themes was conducted by the primary investigator and graduate student. Separate coding began using thematic analysis as described by Braun and Clark, 2006. This method includes steps such as familiarizing

oneself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report.[64] Upon completion of coding of each transcript, the coders met to establish a consensus of themes. Final coding was facilitated through NVivo 12 software. Themes and subthemes were developed using the four identified factors in the Rural Health Nutrition Care Model, access and resources, sociocultural characteristics, traditional foods, and health behaviors, as a guide.[59]

CHAPTER FOUR: RESULTS

Fourteen CHWs participated in the online questionnaire. Six of the 14 CHWs participated in the over the phone interviews. All participants identified as female. The average age of participants was 52.9 ± 15.9 years. Almost all (92.8, n = 13) self-reported as White/Caucasian/European American. The remaining CHW self-reported as Black/African American. The majority of participants reported being a college graduate, 42.9% (n = 6), and among the remaining, 35.7% (n = 5) reported having completed high school, and 21.4% (n = 3) reported having completed some college. The majority of CHWs had been serving in their role between less than 1 year to 7 years (see **Table 4.1**). One CHW reported having worked in their role of CHW for less than 1 year. Although inclusion criteria stated that the participant must have served at least 12 months in their role as a CHW, this CHW was included due to the low participant level. When excluding the CHW with less than one year of experience, mean age was 55.8 ± 14.6. Mean and standard deviation for the CAS and CCB subscales were 5.99 ± 1.16 and 5.24 ± 1.83 respectively. Cronbach's alpha for the CAS and CCB subscales were 0.850 and 0.851 respectively.

Table 4.1 Participants' Demographics and Cultural Competence Assessment

Variable and Category	n=14
Female n (%)	14 (100)
Age (years) m ± SD	52.9 ± 15.9
Ethnicity [a] n (%)	
White/Caucasian/European American	13 (92.8)
Black/African American	1 (7.14)
Education n (%)	
High school	5 (35.7)
Some college	3 (21.4)
College graduate	6 (42.9)
Years worked as a CHW n (%)	
Less than 1 year	1 (7.14)
1-3 years	5 (35.7)
4-7 years	4 (28.5)
8-10 years	1 (7.14)
More than 10 years	3 (21.4)
CCA m ± SD (Cronbach's alpha)	
CAS	4.93 ± 0.67 (0.848)
CCB	5.37 ± 1.17 (0.873)

[a] No participants reported being "Hispanic/Latino (including Mexican, Mexican American, Chicano, Puerto Rican, Cuban)", "American Indian/Alaskan Native", Asian (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, or other Asian)", "Native Hawaiian/Pacific Islander", "Arab American/Middle eastern", or "Other".

4.1 Qualitative Interview Themes and Corresponding Questionnaire Item Responses

Overall, 6 CHWs completed the in-depth qualitative interview and 14 CHWs completed the quantitative questionnaire. From the interviews, 5 themes were identified. Additional information gathered from the questionnaires was used to further explain the themes.

4.2 Specific Aim 1: Economic and Sociocultural Influencing Food Access and Dietary Behaviors

Specific Aim 1 explores economic and sociocultural factors related to access to food and dietary behaviors in Eastern Kentucky as they relate to services addressing food insecurity and diet quality in Eastern Kentucky. The following four themes emerged, *Barriers in Providing Food and Nutrition to Clients, Challenges when Addressing Hunger, Factors Influencing Food Choices and Solutions to Hunger.*

Theme 1: Barriers in Providing Emergency Food Resources to Clients

This theme specifically focuses on the barriers that the CHWs and their clients face when trying to obtain food from emergency food resources in their communities. These barriers include access to immediate food resources, distance and transportation, willingness to ask for help, and individuals misuse of the resources. The following sub themes emerged in response to the question "What if any barriers can you identify regarding providing food and nutrition for your clients?".

Access to Immediate Food Resources

Nearly all CHWs (n = 5) reported lack of access to immediate food resources being a major barrier. The term immediate refers to the immediate need of the emergency food resources. This includes lack of access to well-funded and stocked food banks, emergency food boxes, volunteers to work at the food banks, and healthy foods in general. CHWs recounted the struggles of trying to find immediate food resources for their clients:

> *Mhm lack the resources for us to obtain it, … I know one church that for sure I could get but that one church is reached out to by many, …, so the pots gonna run dry eventually. I wish there was ways that we could do more like, if there was more food banks. (Interview 3)*

Even if there were multiple food resources in some communities, the need in the community is so great that CHWs reported struggling to find consistent food resources, e.g., monthly availability, for their clients. One CHW described the difficulty of having to balance the few resources that they do offer:

> *If I've already used resource A uh the month before for them then more than likely I'm not going to be able to use that again. The resources don't let them continuously use them every single month because there's a limited amount … so they have to, they just spread it as far as it'll go, so they cannot, … continuously give it to just that one family. So if they come in and they used resource A the month before, then I have to jump to B, C, … I gotta figure out ones that they haven't used and see if we can get them from there. (Interview 5)*

Furthermore, even when they could get immediate food resources, such as emergency food boxes from community food banks, they did not typically include nutritious foods or basic tools to prepare the food with. Seasonality was also reported as a factor in the Appalachian region because many fruits and vegetables are not available or affordable year-round. The same CHW commented on further barriers to receiving food boxes such as:

> *… if it was my choice and they sent me up to the pantry I would try to pick …, as best as I could, but in the food boxes you're usually getting uh frozen pizza, frozen pancakes, you know, quick stuff that's … kinda easy, … Poptarts stuff like that … Vegetables and stuff but there's one and that's during the summer months, yes. It's mostly just that fast stuff, … raviolis in a can and stuff like that. (Interview 5)*

On the questionnaire CHWs identified populations that they encounter that did not have resources. Of these, the top three populations that CHWs believed had the most

urgent needs included women (85.7%, n = 12), elderly (78.5%, n = 11), and men (64.2%, n = 9). Adolescents (21.4%, n = 3), Children under 5 (21.4%, n = 3), and children between 5-11 (28.6%, n = 4) were among the lowest identified by CHWs.

Transportation, Distance, and Weather Lead to Reduced Access to Food

All CHWs (n = 6) identified transportation as a barrier to providing food and nutrition to clients. This includes transportation to acquire food from the grocery store, food banks, convenience stores, and other places in the community that people obtain food; medical services; and the CHWs office. Some factors that CHWs identified that lend themselves to this problem are the lack of public transportation (n = 2) and the cost of gas and upkeep of the car (n = 2). A CHW spoke about how transportation can further the difficulty of getting immediate food resources to their clients:

> *Lack of transportation on their part to go get the food, because a lot of your foodbanks and things require they be there. They sign papers and some people just don't have the means of getting there … Uh well one in particular sort of what I was thinking of when I said that um he was an elderly man … he wasn't getting enough food and I tried to get him food from a mission place and deliver it to him and they wanted him to come there and he had no transportation and so I never did get the food. I finally just gave up. (Interview 2)*

Half of the CHWs (n = 3) identified distance as a barrier for clients to access food and other helpful resources in their own communities as well as in surrounding communities. CHWs spoke about how distance is a unique barrier that can cause difficulty in getting immediate food resources to clients in their communities:

> *The distance. Trying to provide food and we're so spread out and for instance the senior center here provides lunch for seniors but they only go so far out. You know, and it's not even, I don't even think it's five miles they go, it's not very far, but it's because lack of funding that they … can't afford to go any farther. (Interview 2)*

> *[Our] County is fairly large um so it's hard like some transportation getting them to be able to get to the food pantry or getting them to even be able to get to… an actual grocery store that would have healthy food … is difficult. (Interview 4)*

Extreme weather can cause further difficulty in providing food and nutrition to clients regarding transportation and distance. Extreme weather conditions that were mentioned were rain and snow. Only one CHW mentioned this but it is something that is common among communities in the Appalachian Mountains. The CHW recounted how severe weather such as flooding and snow impacts travel in their community:

> *I guess weather [is] probably be the biggest impact on getting food to a family. Um we've been blessed with not having a whole lot of snow the past little bit, you know, but we've had that rain so weather will sometimes be a deterrent and ice, getting uh being able to get out and get through to the families. (Interview 4)*

Willingness to Ask for Help to Obtain Food

A few CHWs (n = 2) identified unwillingness to ask for help or trust issues as a barrier to providing food and nutrition to clients. This includes clients not wanting to share the full scope of their problems due to fears of judgment. One CHW recounted the struggles of clients who aren't telling the whole story:

> *Um it's barriers because a lot of people are um I don't know if I should say prideful but you know they don't want to let you know that they're in need when they really are in need. (Interview 6)*

In the questionnaire CHWs identified if there was stigma associated with visiting the food pantry and if the stigma prevents clients from visiting the food pantry to obtain food. Overall, 42.8% (3.21 ± 1.051) of CHWs either agreed or strongly agreed with the statement "There is a negative stigma associated with visiting the food pantry in the areas my clients reside." In addition, 50% (3.29 ± 1.267) of CHWs either agreed or strongly

agreed with the statement “The stigma associated with visiting the food pantry prevents my clients from using it to obtain food.”

Misuse of Food Assistance Resources

Half of the CHWs interviewed (n = 3) identified individuals misusing the food resources in the community as a barrier when providing food and nutrition to clients. This includes misusing food resources to make money, ultimately taking these resources away from individuals who need to use them. One CHW included that individuals in their community sometimes sell food stamps for money to buy harmful substances instead of using them to buy groceries for their children. A CHWs commented on times when they encountered this barrier:

> *… sometimes I can’t help them, … cause you’ve got some that will run every program out and then there’s none left, … that’s why I’ve you know kept logging things more carefully, keeping up with it because I always want them upfront … do you really need this box this month, you know because you know you’re down to no resource … cause you know you usually just have someone get them, and I mean I hate to say that, just cause to be getting them. So, I like to let them know, this is where you’re at with the food boxes now. (Interview 5)*

Theme 2: Challenges when Addressing Hunger

This theme specifically focuses on the challenges that CHWs face that further complicate addressing hunger with families. These challenges include variability in availability and affordability, prioritization of spending, and special populations such as addiction, disabilities, homelessness, having multiple families living in one household, and health problems.

Variability in Availability and Affordability of Food

All CHWs (n = 6) identified lack of resources as a challenge when addressing hunger in their communities. This includes lack of resources such as lack of funding for food resources, multiple resources to pull from, volunteers to run the food banks, or simply having enough food. CHWs also identified whether healthy products are available and affordable in their communities. All CHWs responded to this question but responses were mixed. Overall, they identified that availability depended on where the client lived (i.e., close to town, on the outskirts of town, the amount of grocery stores in their area, etc.). Even when CHWs reported availability of healthy products, they were not affordable to most. CHWs (n = 4) reported that it was cheaper to eat unhealthy foods than healthy foods. Two CHWs identified that was perceived by their clients that it was cheaper to eat unhealthy foods than healthy foods, while the CHW themselves thought that it wasn't. One CHW discussed the price difference of a healthy meal versus an unhealthy meal at a fast-food restaurant:

> *… you can go to Wendy's and spend, $8 on a salad, where you can get a 5 for 5 and get a junior bacon cheeseburger, nuggets and a drink and fries and all that … it's very expensive to eat healthy… (Interview 6)*

Prioritized Food Spending

CHWs also identified client's financial status as a challenge when addressing hunger. A few CHWs (n = 3) identified having a fixed income as a major challenge for clients when trying to purchase healthy foods. Two of these CHWs specifically mentioned this as a problem for elderly clients who are drawing from social security as their main form of income. CHWs (n = 5) also mentioned that many individuals in the

community must choose between buying food and paying bills or buying medication. A CHW recalled specific struggles for clients with fixed incomes:

> *I'm gonna say 99% of the elderly like couples live on a fixed income which is, you know most of time, social security and back then they didn't make that much money, … where they paid their quarters in, so it's not gonna be over probably 1300 a month okay, … some of them are paying a car payment now and some of them are paying vehicle insurance some even pay rent still outta this, you got all your utility bills you have you know your necessity things and when it comes to robbing Peter to pay Paul is their food bill that they brought because they know they can live on soup beans for example if nothing else… (Interview 1)*

Compounded Needs of Special Populations

In the interviews, CHWs identified special populations in their communities that can further complicate addressing hunger. These populations are individuals with addictions (n=3), disabilities (n = 4), homelessness/housing insecurity (n = 4), having multiple families living in one household (n = 3), and health problems (n = 6). Individuals struggling with any of these problems can have further financial strain leading to an increase in food security.

Although only half of the CHWs identified multiple families living together in one household as a challenge, almost all CHWs (n = 5) reported grandchildren living with grandparents or the oldest living individual in the family supporting their children and grandchildren in other ways. CHWs estimated that 20-50% of grandchildren in their communities live with their grandparents. CHWs commented on the extra strain that this puts on the grandparents:

> *I have uh a lot of the older couples that … most of them are raising grandchildren or because of one way either the parents are not in their life, or things aren't good, the parents are in prison or whatever. So they struggle … because they're not adopted the child so they can't get any money so their*

having to raise that child on their income uh so it's a struggle being able to provide their need as far as clothing and stuff that they need to put food on the table, I run into that quite often here lately especially with the big drug problem going on, that these grandparents are raising these kids and … the funding is not there to help them. (Interview 5)

It is evident from some of the comments of the CHWs that many of these special populations listed are interconnected. Individuals with disabilities from work accidents may become addicted to pain medication, individuals who are addicted to substances may become homeless or have to live with their family members, and children of these individuals often end up living with their grandparents.

On the questionnaire CHWs identified special population groups that they have encountered among their clients and their families within the health care environment or workplace. These special populations include mentally or emotionally ill, physically challenges/disabled, homeless/housing insecurity, and substance abusers/alcoholics, gay, lesbian, bisexual, or transgender, and different religious/spiritual backgrounds populations (see **Table 4.2**).

Table 4.2 Special Populations in Rural Appalachia

Special Population [a] **n (%)**	**CHWs who encounter these populations in their work (n = 14)**
Mentally or Emotionally Ill	11 (78.5)
Physically Challenged/ Disabled	14 (100)
Homeless/Housing Insecurity	9 (64.2)
Substance Abusers/Alcoholics	10 (71.4)
Gay, Lesbian, Bisexual, or Transgender	7 (50)
Different Religious/Spiritual Backgrounds	12 (85.7)

[a] Participants were also asked to write in "Other" special populations they may encounter. Only one CHW wrote in "elderly" as an additional special population they encounter in their community.

All CHWs (n = 6) identified health problems as a challenge when addressing hunger. The top 3 health concerns among CHW's clients from the questionnaire were, in no particular order, type 2 diabetes (n = 14, 100%), hypertension/high blood pressure (n = 14, 100%), and heart disease (n = 14, 100%). 92.8% of CHWs put high cholesterol (n = 13). Additional health concerns that were reported by the CHWs in this special populations section are mental health (n = 9, 64.2%), elicit addiction/abuse (n = 6, 42.8%), and prescription drug addiction/abuse (n = 7, 50%). In the interview CHWs identified some challenges associated with having health problems in their community:

> *It's very expensive to eat healthy and that's what a lot of my clients tell me because I deal with a lot of people that are diabetics where we teach those diabetic classes and um a number one complaint is they say they can't afford to eat healthy. (Interview 6)*

Theme 3: Factors Influencing Food Choices

This theme focuses on the unique factors that influence food choices in the CHW's community. The following sub themes emerged in response to interview question "What influences the food choices of your clients?" Additional information may be added from comments made throughout the interviews as well. Almost all CHWs (n = 5) identified factors such as lack of nutrition knowledge and generational differences as unique to their communities. Other factors identified were price (n = 3), availability (n = 2), convenience (n = 3), and preferences (n = 3).

Lack of Nutrition Knowledge

Almost all CHWs (n = 5) identified lack of nutrition knowledge as having an influence on food choices in their communities. This could include basic nutrition education or cooking skills. On the questionnaire 92.8% (n = 13) CHWs identified basic

nutrition education as a health concern among their clients. One CHWs discussed factors that further complicate the lack of nutrition knowledge in their community:

> *If they go to the fast-food restaurant I'm noticing now, everywhere you go it's like do you want to upsize that or extra meat on your Subway sandwich and it's like we push all these bad habits down people and expect them to try to do better when it's like all odds are against them because they don't know, you know, they're just misinformed due to lack of knowledge, um they just don't know. (Interview 6)*

Generational Differences Influence Food Choices

Almost all CHWs (n = 5) mentioned generational differences as an influence on food choices in their communities. This includes differences in preferences, knowledge, or cooking skills. CHWs identified that the older generations in their communities are more likely to grow a garden, cook their own meals, and consume more vegetables. While the younger generations are more likely to buy convenience foods, fast foods, and foods that require minimal cooking skills. One CHW commented on the generational differences regarding food habits that they observed in their community:

> *And it sorta depends on the younger generation vs the older generation who's doing the cooking you know. The younger people don't cook like that … Something quick, something to heat up real quick … it would be probably something out of the frozen section, hot pockets or something that that they can afford to get. (Interview 2)*

4.3 Specific Aim 2: Identifying Solutions to Hunger

Specific aim 2 identifies existing, successful services and solutions to hunger that reduce food insecurity and improve diet quality as they relate to services in rural Appalachian communities of Eastern Kentucky. There were four sources identified regarding this aim, *Resources Available, Churches, Farmers Markets, and School Programs*.

Theme 4: Food Resources Available

This theme focuses on what resources are available in the community and what resources CHWs think they may need more of. The following sub themes emerged in response to question "When a family is in need of food, what are some resources to obtain food?". CHWs identified resources in their communities such as food banks (n = 4), farmers markets (n =6), churches (n = 6), and school programs (n = 5). Overall, CHWs identified that it would be beneficial to have more funding for resources such as food banks and programs ran by churches and schools.

Food Resources through Churches

Churches were the most frequently mentioned resource by the CHWs throughout the whole interview. All CHWs (n = 6) identified churches as a resource for individuals to receive food. All CHWs mentioned that many of the programs that provide emergency food resources either cooperate with churches or are run by the churches themselves. A few CHWs (n = 3) mentioned that there aren't many resources in their communities aside from the churches. A few CHWs (n = 2) also mentioned that although the churches are good resources, they only operate on specific days or times of the month, and it can be difficult to keep up with their schedules. One CHW commented on programs ran through churches in their community:

> *The a the only thing that we have is … a mission place is sponsored by a church and they give food to people and as far as county wide, that's the only place that we have but then in another city in the county they have a group of churches that have come together and created an organization that gives food, but you have to live in that city, so that's limited. And that's the only two places I know. (Interview 2)*

Food Resources through Farmers Markets

Farmers markets were the second most mentioned resource by the CHWs. All CHWs (n = 6) mentioned farmers markets as a good resource for individuals to receive healthful foods, especially during the summer months. Farmers markets were reported to be one of the only places that individuals could get fresh produce in some of their communities.

Food Resources through School Programs

School programs were another resource that was frequently mentioned by CHWs. Almost all CHWs (n = 5) mentioned at least one school program that was available in their community. Two CHWs mentioned backpack programs or similar programs that send home food with children at the end of the day or over the weekend. Two CHWs mentioned schools staying open to provide meals for students on days that school is cancelled or during the summer months. One CHWs spoke about the need for more funding for school programs, specifically school pantries or programs that provide food over the breaks:

> *Some of the schools, some of the elementary schools we have got some pantries in there now, we do have some food pantries in there, I wish we had more than because the children, on the weekend especially, they are able to send home Pop Tarts and um maybe Chef Boy Rd, something that they won't go hungry … I would love to work on getting the high schools back involved um they do community service like projects and they really do this during Thanksgiving and Christmas but they do um like a food pantry where … the students will donate and fix up baskets and things like that. I would love to have that a year-round project so not real sure if it will ever be but it don't hurt to cross your fingers and try. (Interview 1)*

Other Food Resources

On the questionnaire CHWs wrote in other programs that they had access to in their communities. Five CHWs wrote in that they could always provide guidance to families to obtain access to local food banks, commodities, FRYSC Resource Center, FEMA in event of a disaster, and Department of Health and Human Resources (DHHR). One CHW wrote in that they could somewhat often or very often provide guidance to families to obtain access to free community meals.

Theme 5: Solutions to Hunger

This theme focuses on solutions to hunger in the CHW's communities. Solutions to hunger in this sense is identified as a skill that could be learned or action that could be taken to help reduce challenges that community members face when acquiring food. These could be solutions that individuals in the community are currently doing or solutions that the CHWs have identified that may be helpful to learn. Some solutions that were mentioned by CHWs were financial budgeting (n = 6), gardening (n = 6), cooking skills (n = 2), increasing nutrition education (n = 6), utilizing resources already available (n = 3), and community agency (n = 6).

Gardening as a Solution to Hunger

All CHWs (n = 6) mentioned gardening as a skill that would be valuable in helping to reduce hunger in their communities. Half of the CHWs (n = 3) mentioned that they see less people gardening than they used to. Some of the things that CHWs said they see clients growing in gardens are potatoes, corn, tomatoes, cabbage, onions, or green

beans. Some of the barriers for growing a garden that CHWs mentioned were lack of skill (mostly in the younger generations), lack of ability (mostly in the older generations or disabled populations), or lack of land to grow the garden on. Only a few CHWs (n = 2) mentioned knowing about programs in the community that supported gardening, and one CHW reported that she knew that a gardening program existed but was not active in getting individuals involved. One CHW commented on gardening in their community:

> *In our area we have an extension office and they will give free seeds away … like seed potatoes and onions you know them kind of things so, it helps a whole lot if they're able to garden and if they will, it helps tremendously and a lot of them you know, they'll can their food but most of the time you see this in the elderly for some reason, we have lost that gear in my generation type thing. (Interview 1)*

Community Agency as a Solution to Hunger

All CHWs (n = 6) mentioned community agency as a solution to hunger in their communities. The term community agency refers to instances where individuals in the community help others in ways that reduce food insecurity. This includes actions such as lending food or money, cooking meals for neighbors or family members, carpooling, and picking up groceries or emergency food resources for others. Some CHWs recounted instances where they saw this in action:

> *Um for some of them … they will take them to the grocery store … or pick up their groceries for them if they are … like bedridden or … homebound. Um they can pick up their boxes for them at the food shelter, food pantry they bar on their card saying that they're allowed to do that for them … Um and then even like when schools school called off, most of the time the schools remain open to provide meals for under 18, like for those children. And so they might carpool together and kind of pull resources to get them to those locations to be said … Sometimes a neighbor or a friend from church. (Interview 4)*

> *Um some of my clients don't have transportation, like I've got one lady in particular and she has a little man that drives a school bus and he'll come according to his schedule and pick up things I get for her … she don't have*

any transportation, transportation is a big deal for a lot of our elder people if I don't drive or things like that. ... Um the neighbors are great um for the most part, the ones that want help from their neighbors, they'll help and things like that if they recognize there's a need. (Interview 6)

4.4 Specific Aim 3: Community Health Workers' Characteristics, Skills, and Knowledge Related to Addressing Hunger

Specific aim 3 identifies characteristics, skills, and knowledge of CHWs related to addressing nutrition needs of residents in rural Appalachia. For this section, cultural awareness & sensitivity (CAS) and cultural competence behavior (CCB) subscales were assessed in addition to other positions held by CHWs that aided in addressing hunger in their communities. Last, CHWs described their level of knowledge when referring families to specific food assistance programs.

Cultural Competence of CHWs

The CAS subscale mean score was 4.93 ± 0.67. The items in the scale were items 6-16 (Appendix #). Cronbach's alpha for this subscale was calculated as 0.848. The CCB subscale mean was 5.37 ± 1.17. The items in the scale were items 17-30 (Appendix #). Cronbach's alpha for this subscale was calculated as 0.873. A high Cronbach's alpha suggests that these scores are reliable. This would make the mean CCA score 5.14.

Duties of CHWs

On the questionnaire CHWs identified activities that they currently do in their role as CHW. The most reported activities done by CHWs involved health education/information (n = 13, 92.9%), health fairs (n = 12, 85.7%), teaching classes (n = 11, 78.6%), community organizing (n = 10, 71.4%) and presenting in schools,

community centers, etc. (n = 10, 71.4%). One CHW wrote in "I do a little bit of everything!"

Other Positions that Inform the Work of CHWs

CHWs identified other positions, paid or volunteer, that they had or were currently holding that helped them in their role as a CHW. Some CHWs (n = 4) reported having paid positions in medical fields such as working in hospice, clinical secretary, pharmacy tech, dentists' office, or for an eye doctor. CHWs (n = 2) also reported having paid positions in the school systems or at the health departments such as special educators teaching diabetes, cooking, or nutrition courses. One CHW mentioned working as an insurance agent and census worker. On the questionnaire, one CHW wrote in that she also worked as an ICU nurse educator. Regarding volunteering, all (n = 6) of the CHWs reported that they volunteer and most (n = 4) of them reported volunteering with multiple programs. This included activities such as volunteering at food banks (n = 2), church programs (n = 3), and at programs for youth and children (n = 4) was reported.

CHW Self-Reported Knowledge on Food Assistance Programs

On the questionnaire CHWs identified their level of knowledge to refer families to specific food assistance programs such as SNAP, farmers market vouchers, mobile farmers markets, food bank boxes, church pantry food boxes, summer feeding programs for children, garden seed programs, and community gardens (see **Table 4.3**). The top three resources that CHWs reported being able to always, somewhat/very often, or often provide guidance to families to obtain access to were food bank boxes (n = 14), church pantry food boxes (n = 14), and summer feeding programs for children (n = 13). The

resources that CHWs most frequently reported only some/few times, never, or weren't sure if they were able to provide guidance to families to obtain access were community gardens (n = 8), garden seed programs (n = 6), and mobile farmers markets (n = 5). CHWs could also write in other ways they were able to provide guidance to families to obtain access to other food assistance.

Table 4.3 CHW Self-Reported Knowledge on Food Assistance Programs

I am able to provide guidance to families to obtain access to: [a]	Always n (%)	Somewhat/ Very Often n (%)	Often n (%)	Some/Few Times n (%)	Never n (%)	Not Sure n (%)
Supplemental Nutrition Assistance Program (SNAP)	6 (42.9)	6 (42.9)		2 (14.3)		
Farmers Market Vouchers	6 (42.9)	5 (35.7)		2 (14.3)	1 (7.1)	
Mobile Farmers Markets	4 (28.6)	5 (35.7)		2 (14.3)	1 (7.1)	2 (14.3)
Food Bank Boxes	7 (50.0)	5 (35.7)	2 (14.3)			
Church Pantry Food Boxes	7 (50.0)	5 (35.7)	2 (14.3)			
Summer Feeding Programs for Children	8 (57.1)	3 (21.4)	2 (14.3)		1 (7.1)	
Garden Seed Programs	4 (28.6)	4 (28.6)		3 (21.4)	1 (7.1)	2 (14.3)
Community Gardens	4 (28.6)	2 (14.3)		3 (21.4)	2 (14.3)	3 (21.4)

[a] Participants were also asked to write in "Other" food assistance programs in their communities that they have knowledge to refer families to.

CHAPTER FIVE: DISCUSSION

This mixed methods study leveraged CHWs knowledge of food insecurity and nutrition deficits in rural Appalachia in order to identify successful, sustainable services as well as gaps in services that address food insecurity in these communities. Characteristics, skills and knowledge of CHWs were also assessed. Findings from this study provide guidance for the creation of culturally relevant educational programs for CHWs to strengthen their ability to effectively work within their communities to decrease food insecurity and improve diet quality. We were able to identify unique barriers, challenges, and factors influencing food insecurity and hunger, along with unique resources and solutions to hunger in these communities. Last, we identified the CHWs cultural competence, knowledge, and experiences that helps them be successful in their current role as a CHW.

5.1 Specific Aim 1: Economic and Sociocultural Influencing Food Access and Dietary Behaviors

Theme 1: Barriers in Providing Emergency Food Resources to Clients

There were many similarities in barriers that are unique to the Appalachian region in the present study compared to other studies conducted in this region. Similar to other studies, barriers identified included lack of access to food and nutrition services, distance to available resources, difficulty arranging transportation or lack of access to transportation, resistance to accept help, and distrust of outsiders.[38,59,65-67]

Access to Immediate Food Resources

Lack of access to food and nutrition resources was a major barrier that appears in many other studies in the Appalachian region.[59,65,66] Specific to this study, this includes access to immediate emergency food resources, consistent availability of these resources, and access to healthy foods. Two factors that decreased food security in Appalachian communities include the number of food pantries and soup kitchens per person in poverty.[66] Similarly, in our study, not having enough resources for the number of clients was identified by CHWs as a barrier. This barrier speaks to the importance of increasing the number of emergency food resources and programs for individuals in rural Appalachian communities in order to help reduce food insecurity. Similar to Bletzacker, CHWs identified that their clients were dependent on food assistance programs (when available) and emergency food resources. Reasons for this dependence may revolve around persistent poverty and unreliable food systems. The development of a more reliable and sustainable food system, among other things, is needed to help increase access to food in these communities.[66,68]

Individuals in which CHWs believed had the most urgent needs were women, older adults, and grandparents. Other studies identified populations that were more likely to be food insecure as young adults, adults over the age of 65, female-headed households, individuals who had not completed high school, and children under the age of 18.[66,69] One study that examined household food security in rural Appalachia specifically identified elderly individuals as least likely to experience food insecurity which contradicts the findings in our study.[69] Because this study is from two decades ago, this difference may demonstrate the slow reduction in generational skills such as gardening

and food preservation that was observed in our study and others.[65] In the present study, elderly individuals were one of the most mentioned groups in need of assistance throughout the interviews. CHWs identified that although the elderly population was the most knowledgeable about gardening, most were not physically able to grow gardens anymore because of their age. They also mentioned that this skill was not being passed down to the younger generations. Additionally, CHW reports for populations of concern such as adolescents, children between the age of 5 – 11, and children under the age of 5 in our study may be low due to the sample exclusion criteria of the CHWs primarily working with adults. Although CHWs reported the need for these three populations to be lower than adults, they frequently mentioned the need for school feeding programs for high school aged students and younger such as back pack programs or free meals during school closures.

Transportation, Distance, and Weather Lead to Reduced Access to Food

Lack of transportation and distance were also major barriers to receiving and having access to food assistance programs and emergency food resources identified by CHWs. Many other studies have identified lack of transportation and distance as barriers to accessing food in rural Appalachian communities.[59,65,66,70] In our study CHWs identified factors that lend themselves to lack of transportation such as lack of public transportation in these communities and the costs of gas and upkeep of a vehicle. Similarly, another study in this region found that food security had an inverse relationship with distance to nearest WIC office, Food Stamp Program office, and household vehicle status.[66] Environmental factors such as lack of transportation and distance not only keep individuals in these communities from obtaining food resources, they also keep

individuals from accessing health care, treatments, and preventative actions such as screenings and vaccinations.[38,70-72] These findings speak to the importance of improving transportation in these communities as a major step in improving access to food resources. The current study presents the opportunity of improving or creating public transportation programs in rural Appalachian communities as a way to reduce food insecurity.

Extreme weather and topography can cause further difficulty in providing food and nutrition to clients regarding transportation and distance. Although only one CHW mentioned extreme weather as a barrier, this is something that is common among communities in the Appalachian Mountains and has been identified in one other study.[73] In these areas, rain and snow can cause damage to the roads and create dangerous driving conditions.[73] The CHW recounted instances of roads and bridges being destroyed by flooding or ice storms. She stated that currently there was a nearby town that had not been able to access the closest grocery stores for months due to flooding damage to their bridges. She also reported that they did not know when repairs could be made due to lack of funding and that it was common for it to take long periods of time for damage to roads to be fixed. Policy makers have the opportunity for increased funding in these areas to improve infrastructure which can make it easier to access food and other lifesaving resources for the people in these communities.

Willingness to Ask for Help to Obtain Food

Another barrier that presented itself in our study was clients being unwilling to ask for help. CHWs described their clients as private individuals who often have difficulty opening up to strangers about their problems. Other studies have also identified

the phenomenon of distrust of outsiders or being resistant to accept help.[38,59,74] Our study and others identified that individuals in these communities relied on family members and friends outside of the household for food rather than utilizing resources available in order to meet their needs.[75] Our study found that individuals in these communities are more likely to lean on individuals they trust most such as friends and family members when they need help. This action may result from a negative stigma attached to using resources, such as food banks or food stamps, or a lack of trust for "outsiders" which are common in Appalachian communities.[67,76] A study that interviewed health care providers in rural Appalachia emphasizes the importance of having a cultural understanding of the values of individuals in these communities when providing services to individuals in a clinical setting or for health-related reasons.[38] This can be applied to a community setting as well. Our study shows that as members who grew up in the communities they serve, CHWs have a deeper understanding of the reasons why certain resources are used less. This presents the opportunity for CHWs to assist in providing expertise for interventional approaches focusing on decreasing stigma associated with receiving help from food assistance programs.

Misuse of Food Assistance Resources

A unique barrier to providing food and nutrition services to clients that CHW's identified was misuse of resources. Examples were given such as selling food stamps to other community members for money or using food stamps to only buy items like canned soft drinks and then selling those cases to a pawn shop for a profit. CHW's included that often the money from these trades was not used to buy food but harmful substances. In many cases, CHWs described these individuals or ones they are caring for as having

some of the highest rates of food insecurity. Most instances of misuse of resources mentioned by CHWs were connected to substance abuse which is a trend that has only been identified in few studies in this region but is a problem across rural communities.[76,77] One study that evaluated patient perspectives of prescription drug use in rural Appalachia identified trading food stamp cards as a form of currency used to obtain prescription drugs on the streets.[77] The act of selling food stamps for drugs was also documented outside of the Appalachian region in one study in Texas.[78] CHWs identified that individuals in the Appalachian region have a reliance on food assistance programs such as food stamps to be able to afford food. When these programs are being misused it reduces the number of resources for others in the community.

Theme 2: Challenges when Addressing Hunger

There were many similarities in unique challenges that complicate addressing hunger in the Appalachian region in the present study compared to other studies conducted in this region. Similar to other studies, challenges were identified such as variability in affordability and accessibility of food, prioritized spending, fixed income, persistent poverty, and special populations such as disease state, disability, substance abuse, and housing insecurity.[59,65,79,80]

Variability in Availability and Affordability of Food

In the present study, CHWs identified that availability and affordability of healthy food varied in their communities. Factors that affected this included presence and location of grocery stores and supermarkets in the community, and access to transportation to stores.[65,81] If CHWs identified that healthy products were available to

their communities they stated that they were only affordable to some. Similarly, a study in the Appalachian region of Kentucky identified challenges in this region such as limited food retail options, lack of access to produce, and cost of healthy food.[65] They also found that availability of produce may be low because many grocery stores in this region did not carry as much produce simply because "it did not sell well".[65] Another factor identified by CHWs and other studies was the availability and high consumption of fast-food in these communities.[65,80] Similar to the study mentioned before, CHWs identified that it was cheaper to buy unhealthy food at a fast-food restaurant than healthy food.[65] For example, a salad at a common fast-food chain in Appalachia costs $7 while you can get a cheese burger, chicken nuggets, fries, and a drink for $4. Cost of eating healthy was identified by other studies as a challenge to accessing food as well.[65,70] Again, this reinforces the importance of developing a reliable and sustainable food system in these communities to increase access to healthful foods.[66,68]

Prioritized Food Spending

Financial status, or having a low-income, is another challenge that was identified by CHWs in this study. Specifically living off of a fixed income coming from social security, supplemental security income (SSI), or unemployment with little opportunities for increasing that income. CHWs identified populations such as elderly and disabled individuals as most likely to be living off of a fixed income. Low-income status, lack of funding, and persistent poverty was identified as challenges in other studies in the Appalachian region.[59,65,82] A county that is in persistent poverty has 20% or more of its population living in relative poverty in the past 30 years.[83] As socioeconomic indicators increase for most of the US, they stay the same in Appalachia leaving these communities

behind stuck in persistent poverty.[16] CHWs recounted several stories painting the picture of how poverty impacts food security in their communities. Persistent poverty affects all aspects of life including meeting basic needs of life such as food and shelter.[69] The present study found that individuals in these communities who are living in persistent poverty, on a fixed income, often had to choose between buying food and paying bills or buying medication. Because this applies to a vast number of individuals in rural Appalachian communities this presents the opportunity for education on prioritized spending in order to help these individuals balance the little income that they do have. This skill can offer individuals some relief but it will not fix the problem in the long term. Changes in policies are needed in these communities to promote education, create jobs that pay a living wage, increase access to health care, health promoting activities, and improve housing conditions in order to bring financial stability to individuals of these communities.

Compound Needs of Special Populations

Addressing hunger can be even more challenging if individuals are among a special population often found in the Appalachian region. For the purposes of this study, a special population is one that can further complicate access to food and hunger. This study and others have identified further difficulty for individuals experiencing homelessness/housing insecurity, substance abuse, disabilities, and/or health problems.[59,66,69,80] Many of these special populations concurrently face problems of persistent poverty in this region as well. Inter-connected social determinants of health that interfere with reliable, consistent access to food include but are not limited to housing insecurity, financial insecurity, and health status. The presence of any one of

these factors can strain an individual's ability to access food. Prior studies support our findings that many individuals in communities of rural Appalachia experience multiple of these factors at once and often one social determinant of health contributes to another.[38,59,66,84]

Housing insecurity and homelessness were often brought up by CHWs as a challenge to addressing hunger in their communities. Similarly, other studies have identified housing insecurity, household utility insecurity, inadequate housing structures, lack of affordable housing, and homelessness as challenges of rural Appalachia.[38,66,82,84-86] In the present study CHWs described many of their clients' homes as lacking basic utilities such as working kitchen appliances or heating and cooling systems. They recounted stories of clients not being able to use certain rooms because of damage or mold. CHWs also identified that it was common for multiple individuals, both family and non-family, to be living together in these households which is common in these areas due to the high cost of housing and high poverty rate.[87] Many CHWs identified that there were often multiple factors that caused someone to become homeless such as unemployment, substance abuse, disability, and health problems.

Another challenge that presented itself in this study is the common occurrence of non-custodial grandparents raising grandchildren in this region. A custodial grandparent is one that is responsible for the basic needs of minor grandchildren.[88] For the purposes of this study, a custodial grandparent is one that has full custody of their grandchildren while a non-custodial grandparent does not. Although this is not a new phenomenon in this region, dating back to the early 2000s, it has recently begun to increase in frequency possibly due to the increase in factors such as female-headed families, divorce, parental

substance abuse, and parental criminal activity.[87,88] Many other studies have identified grandchildren being reared by grandparents in rural Appalachian communities.[87-90] Both custodial and non-custodial grandparents are likely to experience poverty, housing insecurity, and food insecurity.[90] CHWs in this study and other studies identified lack of resources for grandparents rearing grandchildren.[88,91] Accessing resources for minor grandchildren is particularly difficult for non-custodial grandparents. Many government resources require grandparents to become the legal guardians of the grandchildren in order to receive additional funding.[91] CHWs discussed that this is easier said than done as many parents don't want to give up being the legal guardian because of emotional reasons such as guilt, or the parents want to continue to benefit from being the custodial parent. More resources are needed as CHWs and other studies have identified that 20-50% of their clients were rearing grandchildren.[88]

Substance abuse was mentioned by most of the CHWs as a challenge to addressing hunger in their communities. Like many other challenges mentioned in this area, substance abuse and addiction were often mentioned when talking about other social determinants of health such as housing and food insecurity. Many other studies in this region have focused on substance abuse and addiction and how they affect quality of life and food insecurity.[59,79] Drug use and drug related death began rising in Appalachia as well as the whole country in the late 1990s.[92] By 2017 deaths related to drug overdose in Appalachia were 65% higher than the rest of the US.[93] States in Central Appalachia, such as West Virginia, Kentucky, and Ohio, were among the highest recorded rates of drug overdose related deaths.[94] Today rates of drug overdose related deaths in this region remain higher than the US as a whole. The current study and others identified that

individuals who participate in drug recreation are more likely to be involved in crime, experience food insecurity, homelessness, have low high school completion rates, and have children reared by grandparents.[79,89,92] CHWs in the present study reported that many individuals in their communities did not feel safe in their communities because of drug related crime. Further, studies have identified that individuals of these communities may distrust medical professionals because they are the ones prescribing prescription drugs and fear that their treatments will not be effective.[74,95]

Disabilities were mentioned by CHWs as a challenge to addressing hunger in their communities. This includes both mental and physical disabilities which have been identified as a challenge in this area.[96,97] CHWs identified that both mental and physical disabilities can affect food security status. CHWs described that there are many individuals in these communities that become physically disabled at a young age due to the higher availability of labor-intensive jobs in this region. CHWs and other studies discussed how injuries that cause disabilities can lead to other problems such as addiction to prescriptions, unemployment, homelessness, obesity, and other health problems.[96-98] Again, persistent poverty has a close relationship with disability. Things such as poor nutrition, working, and living standards, and limited access to health care contribute to high levels of disability in this region.[82] A study that assessed food insecurity in the United States identified that food security status may differ depending on the type of disability (i.e., mental vs. physical), employment status, and who in the household has the disability (i.e., primary earner, multiple members, dependent).[96] Similarly, CHWs identified that disabilities restricted community members capabilities in various ways. Examples include reports ranging from individuals being unemployed to individuals not

being able to prepare a meal for themselves. Other studies identified that individuals with disabilities are often lumped into one group which limits their options when trying to obtain financial, food, and even health care assistance.[96,97] More culturally relevant programs need to be created in order for individuals in these communities experiencing a range of disabilities to receive proper help and care. Because CHWs already have knowledge on these individuals they have deeper knowledge of community and cultural needs that are necessary when developing interventions for this special population.

Having health problems was another major challenge in addressing hunger identified by CHWs in this study. Health problems that were identified by this study are consistent with other studies taking place in the Appalachian region, type 2 diabetes, hypertension/high blood pressure, heart disease, and high cholesterol.[59,69,80] The costs associated with health problems can introduce further challenges to addressing nutrition concerns in this region. Cost was identified by the present study and one other as a reason for not being able to purchase prescriptions and follow recommended medical advice.[74] Being able to afford healthful foods and medications can make a big difference for individuals of poor health. A study that examined household food security in rural Appalachia found that most individuals in this area who were experiencing health problems were experiencing some form of food insecurity.[69] Because of the high rates of diseases, disabilities, and addiction in the Appalachian region the perception of health has been altered in these communities. Although this is not something that was not directly addressed in this study, it appears in one other study done in the Appalachian region.[80] A study that assessed self-rated health in rural Appalachia identified differences in health perceptions of Appalachian patients.[80] They found that Appalachian residents had a high

likely hood of reporting themselves as healthy even though they had a disease, disease symptom, or poor overall health.[80] CHWs identified that there were many misconceptions in this population about health and what foods were healthy that lent themselves to food insecurity. Similarly, other studies identified that this population had low nutrition knowledge, little knowledge on what health behaviors were risk factors for these diseases, fatalistic views, and misinformation about how to treat or prevent the disease.[36,59,74,99] Education on these diseases along with their nutrition requirements is one step in reducing poor health related to food insecurity but it will not solve the problem.

All of these special populations and more can be related back to regional struggles with persistent poverty. Health disparities in the Appalachian region are impacted by population decrease, economic decline, and increased poverty.[65] Individuals in this region are not able to eat the foods that they need and are experiencing food insecurity because of the costs associated with their disease state, living conditions, substance abuse problems, and/or disabilities, all of which they are balancing on a fixed income. As socioeconomic indicators increase for most of the US, they stay the same in Appalachia, leaving them behind.

Theme 3: Factors Influencing Food Choices

There were many similarities in factors that influence food choices in the Appalachian region that were identified in the present study compared to other studies conducted in this region. Similar to other studies, CHWs identified factors such as access, availability, convenience, price, preferences, nutrition knowledge, and generational

differences.[59,65,99] Lack of nutrition knowledge and generational differences were the two most identified factors by CHWs.

Lack of Nutrition Knowledge

Lack of nutrition knowledge was a main factor influencing food choices mentioned in the present study and others. Similar to our study, other studies have identified lack of nutrition knowledge, misconceptions about what foods are healthy, and a lack of skills to prepare food as a major influence of food choices.[59,65,99] Similar to health problems, individuals in these communities have misconceptions about which food practices are healthy.[59] Some of the reasons behind this lack of knowledge may be due to the low education levels in Appalachian communities or lack of funding for nutrition or cooking programs. A few CHWs identified that even when they taught their clients about healthy foods, they were not receptive to changing their eating patterns. Some reasons for this may be interconnected with other factors such as price, availability, convenience, preference, or even being unreceptive to change. A study that explored health disparities in rural Appalachia identified that community members were often not receptive to change because they believed that if it was good enough for their parents it was good enough for them, regarding fried foods and "country cooking".[59] They also identified that individuals in these rural areas are more likely to eat the same way they ate as a kid because that is what they know.[59] Another study that evaluated local food systems in rural Appalachia suggested that individuals in these communities lacked will to choose better foods along with knowledge of how to prepare them.[65,99] Lack of nutrition knowledge can deter individuals from trying healthier foods or cooking styles because they can seem intimidating. One way to improve nutrition knowledge in these

communities is by starting to educate students at younger ages on healthful foods and cooking skills. Repeated exposure to healthful foods and cooking methods is one step to improving nutrition knowledge in rural Appalachian communities.

Generational Differences Influence Food Choices

Age is another factor mentioned that influences food choices in these communities. One main difference identified in the present study and others is the transition from traditional Appalachian foods to processed and convenience items.[59,80,100] In the present study, CHWs identified that older adults were more likely to consume fruits, vegetables, and home cooked meals, while the younger generations were more likely to consume fast food, convenience foods, and processed foods. A few studies have suggested that the higher availability and intake of convenience foods among the younger generations may be linked to the rise in chronic diseases in Appalachia.[59,70,101] Another difference between generations that was brought up in the current study and others is the difference in skills, specifically gardening/farming, preserving, and cooking.[65,70] CHWs identified that the older population was most knowledgeable about growing their own produce but many individuals were not able to continue gardening/farming because of physical ability or lack of land. They also identified that the skills of gardening and cooking were not being passed down to the younger generation.[65] This and increasing access to cheap processed convenience foods has led to the loss of these skills in the younger generation.

Key Findings from Specific Aim 1

Findings from this section support recommendations such as focusing on reducing barriers and challenges to accessing food and emergency food resources. These include strengthening public transportation to increase access to food as well as creating food assistance programs targeted towards non-custodial grandparents raising grandchildren in these communities who are living on a fixed income. Focusing on reducing these barriers and challenges may not only reduce food insecurity but quality of life for these communities as a whole.

5.2 Specific Aim 2: Identifying Solutions to Hunger

Theme 4: Food Resources Available

Similar to other studies in the Appalachian region, CHWs discussed the availability of resources in churches, food banks, farmers markets, and school programs.[15,65,101-105]

Food Resources through Churches

All six CHWs identified churches as a location that provides resource for individuals to receive food. Churches were mentioned by CHWs throughout the interviews 32 times making them the most mentioned resource. CHWs identified that many churches either cooperated with emergency food resource programs or were working independently to address food insecurity in their communities. This has also been observed in recent studies taking place in rural Appalachian communities.[15,65,102] Some common ways that churches address food insecurity are holding local food pantries, serving weekly free meals, or providing emergency food boxes.[15] CHWs

mentioned that free community meals were one of the resources that they could regularly find for their clients. They also identified religion as a strong aspect of their communities' culture and stated that individuals often lean on the church when they are having health or food related problems. CHWs described that there is a higher level of trust between church members due to the close nit relationships within the churches in their communities. Problems such as lack of trust or fear of stigma when receiving nutrition and medical related services exist in rural Appalachian communities.[58,74,76,95,106,107] Lack of trust of medical professionals is common in rural Appalachian communities because these professionals often come from outside of the community making nutrition education in these settings less effective.[106,107] Because there are trust networks already built within churches, this creates the opportunity for faith-based nutrition programs in this region. Other studies have also identified churches in rural Appalachian communities as ideal environments for health interventions.[15,101] Because of the communities' trust in churches, there is an opportunity to use churches as a non-traditional setting for food related resources and nutrition education. Possible topics include classes on cooking, nutrition, or diet-related diseases may be an effective approach in the Appalachian region.

Food Resources through Farmers Markets

Farmers markets are another community resource mentioned by all six CHWs. CHWs described farmers markets as one of the only places that individuals could find fresh produce in their communities. CHWs reported a small number of farmers markets in their communities and that many individuals did not use them. In another study, Appalachian residents of Kentucky also reported a decline in use of farmers markets.[65]

Their study suggests that the decline in farmers markets may be due to the decrease in interest of skills such as farming and gardening in the younger generations.[65] Another study done in the Appalachian region of Kentucky suggests that the decrease in farming and gardening skills may be due to increased access to convenience and fast foods.[70] The dwindling number of farmers and seasonality were challenges that were also mentioned by CHWs in the current study. A study that interviewed participants of WIC about their knowledge on local farmers markets in their Appalachian communities found that only a third (5 out of 15) of their participants had ever visited their communities' farmers market and only one individual visited frequently.[104] Out of the participants that had never visited a farmers' market, half did not know that they were available in their communities.[104] Similarly, CHWs discussed that while farmers markets were often one of the only places to get fresh produce in their communities, individuals often were not aware that there was a farmers' market and if they were they did not use them. Some reasons for low usage reported in the current study and other studies include barriers such as transportation, weather, lack of knowledge and skill about preparing these foods, pricing, and the farmers markets being held at inconvenient times that interfered with schedules.[65,104] Although most CHWs identified that they could always or somewhat often provide guidance to families on farmers market vouchers, these barriers seem to be keeping individuals in Appalachian communities from utilizing their farmers markets.

Food Resources through Food Banks

Four CHWs identified food banks as a resource used for emergency food assistance. However, many instances when food banks were mentioned, CHWs reported limitations that are faced by the foodbank in their ability to provide food. CHWs

described problems for food banks such as lack of funds, lack of volunteers, lack of fresh fruits and vegetables. They described that the foods that are most commonly available for food banks are often highly processed, convenience foods. Canned goods are common but fresh produce is rare because food banks mostly run on non-perishable donations that do not need to be refrigerated.[103] Barriers such as lack of transportation, distance, or weather can also keep individuals from accessing food banks.[105] The need for emergency food assistance in these communities is so high that the food banks are stretched thin. CHWs reported that food banks in rural Appalachia have a higher number of clients and suggested the need for regional expansion of food banks in rural Appalachian communities. Other studies support the need for expansion due to the increase in use of food banks in this region.[21,102,105] Although the short-term goal of increasing the amount of food banks would be useful for meeting community members immediate needs for food assistance, it will not solve the problem of food insecurity long-term. Reliance on food pantries, along with other food resources in rural Appalachian communities, was identified in the current study and others.[21,102,105] To completely address the problem of food insecurity in rural Appalachian communities both short-term solutions, such as strengthening food bank networks, and long-term solutions that help reduce community reliance on emergency food programs are necessary.

Food Resources through School Programs

Food assistance programs ran in schools were mentioned by five CHWs as a resource for community members. These include backpack programs, school pantries, and free meals during school closures.[67,103] Backpack programs offer food for children to take home after school to ensure that they have food to eat at home.[108] Generally, these

foods are child-friendly and require little preparation such as food kits targeted towards children, canned meals, and individually packaged snacks.[108] Frequency of distribution of these food bags vary from school to school.[108] Some are only sent home on weekends and some are sent home every day with students depending on the amount of food these programs have available to give. Several challenges in choosing food for children exist though. CHWs identified that although this is a good emergency food resource for children, they often do not always contain healthful foods. For example, there may be a lack of proper refrigeration to store healthier food items such as milk and yogurt. Some examples of items CHWs in the current study identified that these backpack programs often sent home were pop tarts, Chef Boy RD peanut butter, and fruit juice. A study on Backpack Programs in Kentucky listed item such as cereal, shelf-stable milk, granola bars, peanut butter/cheese crackers, little sausages, baked beans, Spaghetti-O's, ravioli, soup, fruit cups, dried fruits, or puddings.[108] Some children may not be able to rely on an adult to help them prepare food. Therefore, something that can be opened and ready to eat or simply microwave, is more desirable to offer to children, especially younger children with limited knowledge, ability, and accessibility to cook or chop foods. Nonetheless, these school programs offer relief to parents and grandparents of children struggling with food insecurity.[67] Especially for non-custodial grandparents, who have difficultly receiving extra help from food assistance programs for the children they're taking care of. Strengthening these school feeding programs may be a good way to support children taken care of by custodial and non-custodial grandparents facing food insecurity.

Theme 5: Solutions to Hunger

There are many similarities in solutions to hunger for rural Appalachian communities identified in the present study compared to other studies conducted with participants from this region. Some solutions that we identified in the current study and are supported by others include financial budgeting, increasing nutrition education and food skills (i.e., cooking, gardening, preserving), strengthening and increasing usage of resources already available, and improving public transportation.[65,66,80] Two solutions that are unique to rural Appalachia that appear in both the current study and others are gardening and community agency.[65,101]

Gardening as a Solution to Hunger

All six CHWs identified gardening as a solution that individuals in their communities would benefit from. Half of the CHWs discussed that they observed less individuals gardening in their communities than in the past.[65,70,109] Reasons mentioned for this were the lack of gardening skill in the younger generation by four CHWs, lack of physical ability to garden in the elderly and disabled populations by two CHWs, and lack of easily accessible land to grow on by one CHWs. Because of the increased access to convenience foods for residents in the Appalachian region of Kentucky, CHWs reported their client's believe that there is less of a need to have skills, such as gardening and preserving food, that supplement an individual's food. A study that conducted focus groups in the Appalachian Region of Kentucky found that the increased availability of processed foods and fast food in these communities coincides with the reduction of gardening and farming among rural Appalachian residents.[70] CHWs reported that there is

a need to increase home and community gardens to increase access to fresh fruits and vegetables and expressed concern about convenience foods and fast food displacing the need to learn how to grow food.

CHWs reported that there were resources for gardening in their communities that were not widely utilized. Examples provided were the free seeds, starter plants, community gardens, and gardening classes offered by the cooperative extension office and community action centers. Not one specific gardening program exists in the Appalachian region, but many programs exist and have support through an organization named Grow Appalachia. Grow Appalachia is a program founded in 2009 at Berea College in Kentucky that works to reduce food insecurity by distributing garden resources, holding classes, providing technical assistance to farmers and market gardeners, and investing in community infrastructure by supporting commercial kitchens and farmers markets among other things.[110] This program has been utilized by over 60 counties and 6 states to improve food insecurity in Appalachian communities.[110] In Kentucky, Grow Appalachia has partnered with programs in 14 counties within Appalachia.[111] Some Kentucky communities also participated in programs in one county in Virginia and two counties in Tennessee.[111] In the current study, CHWs reported that because of the distance and terrain some community members found it easier to drive into bordering states to access food and resources.

Grow Appalachia was mentioned by other studies in this area as a resource often used by individuals to be able to increase their access to fresh fruits and vegetables.[65,109] In the Appalachian region of Kentucky, Grow Appalachia has worked with farmers markets, community centers, cooperative extension offices, ministries, heritage centers,

missions, and schools.[111] Grow Appalachia has been successful in Knox County, Kentucky, a county that is adjacent to ones surveyed in this study.[109] Through funding from Grow Appalachia, they created the Grow Appalachia Gardening Program which works to implement agricultural programs, support home and community gardens, and establish the Knox County Farmers' Market.[109,112] CHWs in the current study proposed that giving their community members the skills and tools to have home and community gardens would be a great way for them to supplement food for their households. One CHW reported knowing about the gardens at the Pine Mountain Settlement School, a program that is funded by Grow Appalachia, but was not knowledgeable about how to get involved. The findings from this study provide recommendations that include training of CHWs in identifying gardening programs and learning how to connect local gardens and farms to nonprofit organizations that provide support for these communities.

Community Agency as a Solution to Hunger

Community agency, or the idea of community members working together to increase their access to food and other healthful behaviors, was identified in the current study and others in this region.[65,101,102,105] All six CHWs recounted times that they had seen individuals in their communities helping others access food. Similarly, other studies have identified actions such as sharing food with family and community members and carpooling to grocery stores or places to obtain food.[65,70,81,102,105] One study described a food bartering and sharing network within Martin County, Kentucky that helped increase access to fresh produce.[65] Participants of their study described that community members with home gardens would distribute unused produce to family members and neighbors.[65] This study suggests that instead of enhancing farmers markets, increasing capacity for

home and community gardens may be a solution to increasing access to fresh produce in rural Appalachian communities. The current study and other studies identified that there were many barriers that kept individuals from utilizing farmers markets. Strengthening community members gardening skills may lead to the creation of food sharing networks for fresh produce. Another study that surveyed individuals in rural Appalachia described the need for sharing of skills and behaviors across generations in these communities.[101] Similar to the current study, they found that older adults in these communities generally consume a diet higher in fruits and vegetables than younger generations, while younger generations were more physically active than older generations. This creates the opportunity for a "cross-generational buddy system" where older and younger generations could benefit from learning from each other within these communities.[101] For example, an older individual could share their knowledge on gardening with a younger individual and the able-bodied, younger individual could then in turn help the older individual tend the garden. So, the skill gets passed on to the younger generation while the older generation would have help and their food supplemented from the garden. This cross-generational teaching model could be used for varied subjects such as cooking, gardening, preserving, and exercise. This presents the opportunity for CHWs to bring community members of varying ages together when educating them in order to foster cross generational learning and partnerships.

Meeting Basic Needs

Throughout the current study CHWs described the interconnected barriers that further complicate addressing hunger in their communities. Many of these barriers involved lacking the most essential aspects of Maslow's hierarchy for basic needs which

can be seen in **Figure 5.1**.[113] Maslow theorized that an individual's most basic needs must be met before they can attain psychological needs (i.e., esteem needs and belongingness and love needs) and self-fulfillment needs (i.e., self-actualization).[113] The most basic needs include physiological needs, such as air, water, food, shelter, and sleep, and safety needs, such as personal security, employment, resources, health, and property.[113] Without attaining everything on the bottom level of the pyramid, it is very difficult to move on to the next levels.

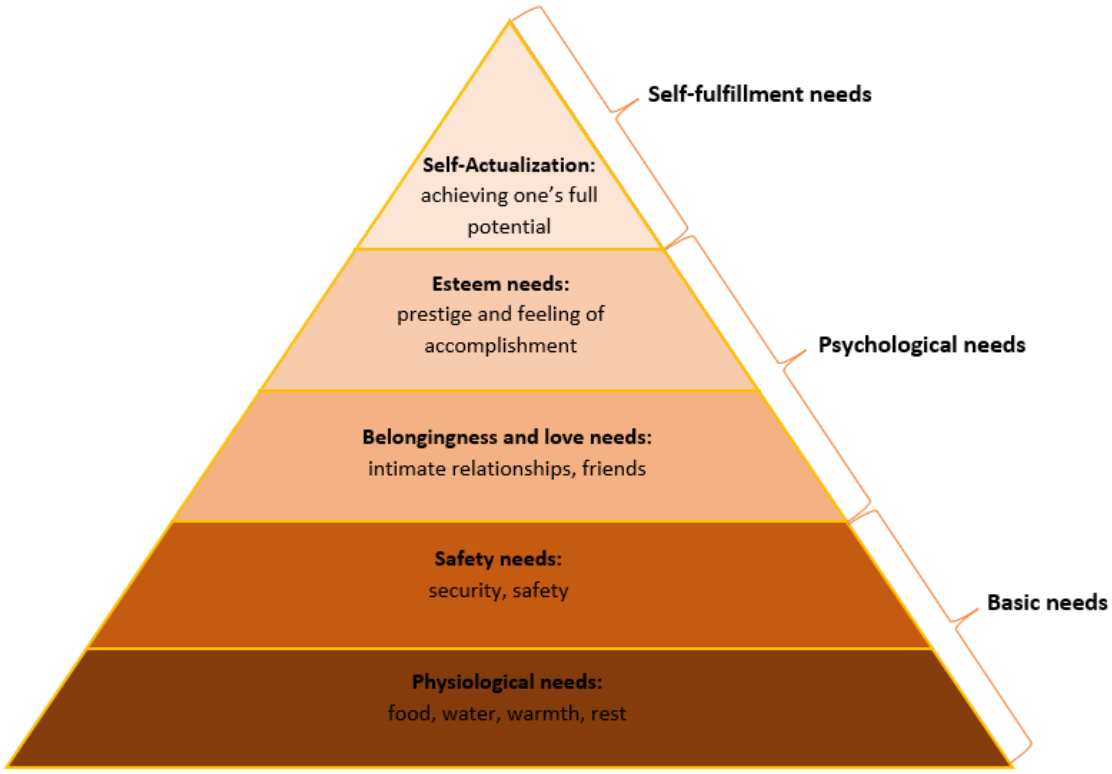

Figure 5.1 Hierarchy of Needs Model Recreation of Maslow's Hierarchy of Needs

One of the most basic needs that is often compromised in rural Appalachian communities is shelter. CHWs in the current study identified that many of their clients

struggled with housing insecurity. They recounted clients telling them that they did not have heating and cooling in their homes or appliances to safely store and prepare food. One CHW observed multiple instances where individuals would avoid certain rooms in their houses because they had damage such as leaks, holes, or mold that they could not afford to fix. Many individuals in rural Appalachian communities face problems such as these with their homes, making it even more difficult for them to meet their other basic needs.[82] Costs associated with poor living conditions and the lack of proper utilities to store perishable food items can make it difficult to consume healthy foods. Working to improve rural Appalachian community members basic needs can make a big difference in improving food security status of these communities. For instance, if an individual was able to make repairs to a hole in their roof, then it may be safe to put an appliance in that room to store perishable items and eat less convenience foods. The Appalachian Service Project (ASP) is a faith-based volunteer organization that repairs and builds homes in rural Appalachia to help reduce poverty in this area.[114] Programs like ASP work toward making long-term solutions for individuals in these communities to reduce the basic needs barriers that can empower people to get jobs and increase economic stability of the community as a whole.[99] By addressing the shelter needs of the individual this creates the foundation for them to be able to be successful in other areas of their life. The findings from this study provide recommendations that include training of CHWs in how to identify programs such as ASP and learning how to connect individuals to local programs that can provide support for individuals with poor housing conditions in these communities.

Key Findings from Specific Aim 2

Findings from this section identify recommendations for unique solutions to hunger for rural Appalachian communities. These include utilizing churches as a non-traditional setting for food related resources and nutrition education. Along with increasing community gardening in order to create a network of food sharing among community members to increase access to nutritious foods. Focusing on the unique current and past values of these communities can increase community participation in reduction of food insecurity and strengthen pre-existing networks.

5.3 Specific Aim 3: Community Health Workers' Characteristics, Skills, and Knowledge Related to Addressing Hunger

Using data obtained from the surveys, this study identified CHW's cultural competence, roles, and knowledge of food assistance programs in their communities. There are limited studies with CHWs from rural Appalachian communities. To our knowledge, this is one of the first studies to look at the roles that rural Appalachian CHWs play in reducing food insecurity in their communities.

Cultural Competence of CHWs

Understanding the local culture can improve outcomes of health behaviors.[95,115,116] Professionals with a high level of cultural competence and knowledge of local culture in rural Appalachian settings are expected to be able to build trust with clients which is necessary when trying to promote behavioral changes to improve health.[38] Because CHWs are expected to have the same cultural background as the clients they serve in their community, they are a good resource for identifying culturally

acceptable solutions for reducing food insecurity and health disparities. Few studies have assessed CHWs cultural competence in rural Appalachian communities. Most studies that have taken place in a rural areas of the Appalachian region focus on cultural competence of physicians and other medical staff.[38,115] One study in rural Appalachia assessed patients' perceptions of the cultural competence of their physicians.[115] They found that patients who perceived their physicians to have a higher cultural competence were more satisfied with their medical interactions.[115] Patient satisfaction increased when physicians were knowledgeable of and inquired about the patient's religion, culture, linguistic differences, and feelings.[115] Our findings indicate several opportunities for CHWs including serving as a cultural liaison to physicians and assisting in cultural competency training of physicians and healthcare professionals in their communities. These efforts may help to improve patient attitudes toward health care providers in their communities and may be a key contributor to improving health outcomes if providers incorporate CHWs into their arsenal of community resources for their patients.

Outside of Appalachia, CHWs are effective medical team members in underserved communities when there is a need for culturally sensitive personnel.[51,52,117] In one study, the provider and staff perceptions of the effectiveness of CHWs in clinical settings were assessed.[52] They found that 58% of providers perceived CHWs as helpful for reducing health disparities, while only 37% of staff perceived CHWs in the same way.[52] They also found that providers and staff who scored higher on the cultural competence assessment were more likely to see the value in using CHWs in interventions to reduce health disparities.[52] Another study integrated CHWs into a medical team and found that CHWs were able to help the team better understand their patients' background,

constraints, and preferences.[117] CHWs were also able to alert the physician to the patients' non-verbal ques and add culturally sensitive clarifications in exchanges between the patient and physician.[117] Because CHWs understand the unique challenges that individuals in their communities face, these findings highlight the benefit of having CHWs participate in patient consults with physicians. Including CHWs in providing healthcare may provide insights into underlying reasons why patients are not able to adhere to the physicians' medical recommendations and help address these needs.

The CCA assessment has demonstrated reliability for use in studies with various medical professionals to assess cultural competence.[60,118] Our study found that the cultural competence of CHWs we surveyed in rural Appalachia was moderately high, with a CCA score of 5.14 (possible range = 1.00 - 7.00). Responses to the CAS subscale questions (possible range = 1.00 - 7.00) indicated that participants had moderately high levels of cultural awareness and sensitivity, with a mean score of 4.93 ± 0.67, compared to a study with neonatal nurses who had a high score at 6.09.[118] Responses to the CCB subscale questions (possible range = 1.00 - 7.00) indicated that they had high levels of culturally competent behaviors, with a mean score of 5.37 ± 1.17, compared to moderate score of 4.67 among neonatal nurses.[118] This study adds to the body of knowledge around the use of the CCA scale to assess cultural competence in the Appalachian region. In addition to the insights provided through the in-depth interviews, the CCA scores confirm that CHWs have a moderate to high level of cultural competence, and therefore supports recommendations from other researchers that it may be beneficial to include them as part of the healthcare team and may be advantageous to invite them to serve as a cultural

competence liaison to medical professionals coming from communities outside of rural Appalachia.

Duties of CHWs in Rural Appalachian Communities

The current study asked CHWs about activities that they were involved in as part of their role. They reported activities such as providing health education/information to clients, visiting health fairs, teaching classes, organizing community programs and activities, and presenting in schools and community centers. Other studies on the roles of CHWs in rural Appalachia found them effective at promoting early screening for cancers, disease prevention and maintenance, diabetes education, increasing adherence to treatments, and increasing community participation in research studies.[57,58,119,120] An additional role of CHWs that was identified in the current study was that of a trusted community member. CHWs identified multiple times throughout their interviews that the trust they have with their clients makes them more effective in their role. Professionals with high levels of cultural competence are skilled in building trust with clients. Because CHWs are culturally competent, they should be able to build trust with clients quicker than medical professionals that come from outside of their communities. This role as a trusted community member is in part due to the cultural competence that they have and also because they can empathize with the clients due to having a similar socioeconomic background. One CHW mentioned that she worked adjacent to a physicians' office and often found that clients were more receptive to treatments if she accompanied them to their appointments. Some roles she reported playing in this environment were taking notes for patients, helping them acquire their medications, and explaining what the physician said in simpler terms. CHWs can be utilized in a medical setting to help

improve health disparities by helping to address barriers such as food insecurity that further complicate disease status.

CHWs also identified other positions that they had held that strengthened their knowledge of the community and helped them in their role as a CHW. Some positions that they reported were positions in hospitals, schools, health departments, insurance agencies, and government agencies. In the interviews CHWs discussed how having prior knowledge in these fields increased their network and enhanced their ability to help meet all the needs of their clients. One CHW discussed how her prior work at an optometrist's office helped her get glasses for one of her clients. Another CHW described how her previous work at a health insurance agency helped her get things like transportation to doctors' appointments for her clients through Medicaid. Many of the problems community members face in these community can worsen food insecurity. Having knowledge on other high need areas is has made CHW's more effective at reducing food insecurity.

CHWs also discussed the volunteer activities in their communities that they participate in. Some volunteer activities that they mentioned were participating in local food banks, church programs, and programs for youth and children. One study suggested that CHWs were more likely to participate in volunteer activities because they see the value that these activities have for their communities.[121] This study also discussed that volunteer programs tend to have limited budgets.[121] In the current study CHWs discussed lack of budget as a major problem for their community's emergency food resources. CHWs identified that many times when they requested emergency food boxes from programs, such as food banks or church programs, they often were told that there were no

volunteers to prepare or deliver the resources, if they reached anyone at all. One CHW discussed how if she needed an emergency food box from a specific program she would have to go and physically make it herself.

CHW Self-Reported Knowledge on Food Assistance Programs

CHWs reported that they are almost always able to provide guidance to clients to obtain access to food bank boxes, church pantry food boxes, and summer feeding programs for children. To our knowledge, this is one of the first studies to survey CHWs' self-reported knowledge on food assistance programs. Findings from our in-depth interviews and survey identified that in their area of expertise, CHWs in rural Appalachian communities are in a position to provide education on food assistance programs and have the trust of the community for increasing acceptance of the use of food assistance programs available to community members. Through the in-depth interview, CHWs frequently mentioned that food assistance resources are heavily relied upon in their communities. They provided specific insights about church and school programs that offered emergency food resources and also identified the extreme need of food assistance in this community. For example, they mentioned that community members could only draw from food banks only once every month, and that they had difficulty keeping up with who had already drawn from them because their clients were often in need more frequently. The CHWs frequently reported that there were not enough food assistance programs to meet the hunger needs of their communities. Similarly, the persistent problem of hunger in rural communities in the U.S. has also been reported in many other studies.[122-124] CHWs had extensive knowledge on food assistance resources that meet the hunger needs of their communities. They offered some ideas to maintain

existing food banks such as supplying churches with large enough refrigerators and freezers to store perishable foods.

A review of the literature of programs that address food insecurity in rural communities were included in the survey. In the current study, CHWs reported having the least knowledge on mobile farmers markets, garden seed programs, and community gardens. In the interviews CHWs mentioned that farmers markets were often one of the only places to obtain fresh produce but individuals often were not aware that there was a farmers' market and if they were they did not use them due to a variety of reasons including transportation. Additionally, CHWs mentioned gardening as a solution to hunger in their communities because they had observed the benefits of supplementing food from home gardens by older adults in their communities. However, they were not as knowledgeable on the programs that offer gardening assistance even though programs like Grow Appalachia were available in and around the communities we surveyed. Increasing CHW's knowledge about the types of food assistance programs may help promote the use of existing programs and promote these programs that offer long-term solutions. One study that reviewed the effectiveness of Supplemental Nutrition Assistance Program – Education (SNAP-Ed) found that merely providing education on SNAP was effective in improving food security.[125] Training on existing programs could increase CHWs confidence in telling their clients about these programs and work towards utilizing programs already available in their communities that promote long term solutions to hunger. Food insecurity topics that CHWs would benefit from being trained on include gardening, budgeting, and existing programs in their communities. Along with education training, other studies support building strong relationships with cooperative

extension programs and being a proponent for policy change in rural communities.[126,127] If CHWs were to increase their knowledge on everything that the cooperative extension programs in their surrounding areas offer they may be more likely to refer clients to cooperative extension for more information or to existing programs like a master gardening program.

CHWs and the Rural Nutrition Care Model

Looking back at the RNCM, findings from the interviews with the CHWs were consistent with what we already knew about people living in rural Appalachian communities identified in this model. Regarding access and resources in rural Appalachian communities, CHWs were knowledgeable on factors affecting food insecurity identified by the RNCM such as location, distance, finances, insurance. CHWs were also knowledgeable on unique sociocultural characteristics in these communities that affect care such as resistance to change, importance of religion, using a whole family approach, building rapport, and using simple messages when working with this population. Additionally, CHWs were able to identify traditional foods, such as familiar foods, and common food behaviors, such as gardening and cooking, within their communities. Last, CHWs were knowledgeable about factors affecting health behaviors within their communities such as substance abuse, self-management, and chronic disease. Because CHWs were able to identify a large amount of the factors identified to affect care in rural Appalachian communities in the RNCM, this shows that CHWs are an appropriate resource to help identify aspects of food insecurity in rural Appalachian communities.

Although there is little research on CHW's knowledge on factors that affect food insecurity in rural Appalachian communities, there is more research available on CHW's being knowledgeable of factors that affect food insecurity and malnutrition in rural countries around the world. One study that took place in Mali Africa assessed CHWs ability to identify severe acute malnutrition (SAM) in children.[128] They found that the majority of children were correctly assessed by CHWs for the presence of SAM.[128] They also found that CHWs were capable of managing uncomplicated cases of SAM and provide culturally sensitive nutritional counseling to parents.[128] Another case study looks at the *Shasthya Shebika* (SS) program in Bangladesh that employs CHWs to address sociocultural factors that affect access to health care services for women.[129] Some of the main roles of these CHWs include providing supplemental food to underserved populations in these communities such as pregnant women and children, monitoring nutrition status, providing vitamin A supplementation, and providing health and nutrition education and surveillance for adolescent girls.[129] This research of CHWs in other countries shows that in areas that don't have many food or health resources CHWs are adequate at monitoring underserved populations and providing resources such as food and nutritional education in the home.

Key Findings from Specific Aim 3

Findings from this section identified unique roles along with areas of improvement for CHWs of rural Appalachian communities. Because CHWs have moderately high levels of cultural competence they can be useful in medical environments where they act as a medical liaison between patients and medical staff. Here they can work to better communicate the underlying reasons why the patient might

not be able to adhere to medical advice and address those problems. Additionally, the opportunity exists to create education for CHWs on gardening and farmers market programs that already exist in their communities so they can better support their solution of increasing gardening among community members. Last, because CHWs knowledge proved to be consistent with what is already known about rural Appalachian communities, this shows that they are an appropriate resource to help identify solutions and opportunities relative to food insecurity in these communities.

5.4 Strengths and Limitations

A limitation of this study is that the findings only represent a small number of CHWs in two of the 13 Appalachian states, meaning that the findings may be unique to these communities and not representative of the Appalachian region as a whole. Additionally, we gathered quantitative data from two states and qualitative data from only 1 of those states. Another limitation is that we may have received biased responses due to the relatively small sample size and self-selection into the study. Even though this study has a small sample size, over 50% of the potential participants responded to the survey. Another strength of this study is that we gathered both quantitative and qualitative data which allows for confirmation of the findings in both the in-depth interviews and surveys, and provided with insights in the opportunities and challenges in the community.

CHAPTER SIX: CONCLUSION

Our study demonstrates the importance of obtaining knowledge from CHWs in rural areas of Appalachia to address problems related to food insecurity. While poverty across the nation decreases, poverty in rural Appalachian communities persists perpetuating food insecurity, and increases the need for culturally tailored solutions to reduce health disparities in these communities. Our findings provide recommendations for future programs, grants, and policies focused on reducing food insecurity in rural Appalachian communities. Our study also adds new knowledge about CHWs by presenting how cultural competency of a convenient sample of CHWs is consistent with the expectation that CHWs are knowledgeable of the unique barriers and challenges that lend themselves to the disproportionate burden of health inequities in their communities. This study identifies CHWs as an appropriate resource to help identify unique aspects of food insecurity, opportunities, and solutions to hunger in rural Appalachian communities. Ideas for future research include: creating training tools for CHWs to assess food insecurity and increase their knowledge on existing solutions to hunger in their own and surrounding communities; examine the effectiveness of presenting nutrition and diet related education in non-traditional settings such as churches; and assess how CHWs can improve quality of care in rural Appalachian communities by being included in the medical team.

Appendices

Appendix A: Institutional Review Board Approval Letter

Modification Review

Approval Ends:	IRB Number:
9/16/2024	43445

TO:	Julie Plasencia, PhD, RDN Dietetics and Human Nutrition PI phone #: 859-257-4146 PI email: julieplasencia@uky.edu
FROM:	Chairperson/Vice Chairperson Non Medical Institutional Review Board (IRB)
SUBJECT:	Approval of Modification Request
DATE:	4/18/2019

On 4/17/2019, the Non Medical Institutional Review Board approved your request for modifications in your protocol entitled:

Leveraging Synergy of Community Health Workers from Dynamic Communities of Rural Who Are Tackling Food Insecurity Challenges

If your modification request necessitated a change in your approved informed consent/assent form(s), the new IRB approved consent/assent form(s) to be used when enrolling subjects can be found in the "All Attachments" menu item of your E-IRB application. [Note, subjects can only be enrolled using consent/assent forms which have a valid "IRB Approval" stamp unless special waiver has been obtained from the IRB.]

Note that at Continuation Review, you will be asked to submit a brief summary of any modifications approved by the IRB since initial review or the last continuation review, which may impact subject safety or welfare. Please take this approved modification into consideration when preparing your summary.

For information describing investigator responsibilities after obtaining IRB approval, download and read the document "PI Guidance to Responsibilities, Qualifications, Records and Documentation of Human Subjects Research" available in the online Office of Research Integrity's IRB Survival Handbook. Additional information regarding IRB review, federal regulations, and institutional policies may be found through ORI's web site. If you have questions, need additional information, or would like a paper copy of the above mentioned document, contact the Office of Research Integrity at 859-257-9428.

Appendix B: Email Recruitment Message

Email Subject: Invitation to take part in a study: Leveraging Synergy of Community Health Workers

Dear member of [insert name of group],

You are receiving this email because you are a member of the [name of group] and your expertise sought for a research study.

Researchers at the University of Kentucky seek to learn more about addressing food insecurity in rural communities and other health-related topics. We also want to learn more about your professional and personal characteristics as community health workers to better understand why community health workers are effective in addressing health-related needs of their community.

The research study consists of an online questionnaire which may take up to 45 minutes to complete. An incentive is provided as compensation for your time. If you believe you may qualify and are interested in completing the questionnaire, please CLICK HERE [will be linked to redcap questionnaire consent form page] to learn more and begin. Thank you.

Sincerely,

Julie Plasencia, PhD, RDN

University of Kentucky

Department of Dietetics and Human Nutrition

julieplasencia@uky.edu

859-257-4146

##

Appendix C: Institutional Review Board Consent Form

IRB Approval
4/17/2019
IRB # 43445
ID # 132058

Consent to Participate in a Research Study

KEY INFORMATION FOR: Leveraging Synergy of Community Health Workers from Rural Communities to Improve Rates of Food Insecurity

You are being invited to take part in a research study to help address food insecurity in rural communities in Kentucky. We aim to identify local-level strategies that are currently used to address food insecurity and find ways to leverage these solutions to improve food security in rural communities.

WHAT IS THE PURPOSE, PROCEDURES, AND DURATION OF THIS STUDY?

We will be conducting interviews with Community Health Workers. The information we collect will be on topics such as knowledge of food assistance programs in the community, broad topics on health and information about professional skills. This information will help us better understand how factors affect food insecurity and nutrition in rural communities.

By doing this study, we hope to learn how to better prepare Community Health Workers with skills related to health and nutrition needs of the community. Your participation in this research will last about 1 hour.

WHAT ARE REASONS YOU MIGHT CHOOSE TO VOLUNTEER FOR THIS STUDY?

Your position as a community health worker provides you with a unique vantage point in the community. For this reason, we believe that your expertise and knowledge about the community can help us address some of the most important issues affecting your community. With your participation, we may find solutions to hunger in rural communities.

WHAT ARE REASONS YOU MIGHT CHOOSE NOT TO VOLUNTEER FOR THIS STUDY?

Risks are minimal for involvement in this study. However, you may feel emotionally uneasy when asked to make judgments based on the questions provided.

DO YOU HAVE TO TAKE PART IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any services, benefits, or rights you would normally have if you choose not to volunteer.

WHAT IF YOU HAVE QUESTIONS, SUGGESTIONS OR CONCERNS?

The person in charge of this study is Julie Plasencia of the University of Kentucky, Department of Dietetics and Human Nutrition. If you have questions, suggestions, or concerns regarding this study or you want to withdraw from the study his/her contact information is: julieplasencia@uky.edu, 859-257-4146.

If you have any questions, suggestions or concerns about your rights as a volunteer in this research, contact staff in the University of Kentucky (UK) Office of Research Integrity (ORI) between the business hours of 8am and 5pm EST, Monday-Friday at 859-257-9428 or toll free at 1-866-400-9428.

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43445
ID # 132058

DETAILED CONSENT:

ARE THERE REASONS WHY YOU WOULD NOT QUALIFY FOR THIS STUDY?

You would not qualify for this study if you are under 18 years of age, currently employed in the role of a community health workers, health educator, para-professional, etc. and you have not served a rural community in this role for the past 12-months.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

The research procedures for the in-person interview will be conducted at the location of your choosing, such as your place of work or office. The in-person interview will last approximately 1 hour.

WHAT WILL YOU BE ASKED TO DO?

If you choose to participate in the in-person interview, the researcher will contact you to schedule the interview at the date, time and location of your choosing. The interview will last approximately 1 hour and will ask details regarding your clients' use and access to food assistance programs, health topics, and ideas for improving food security in the community you serve. This interview will be audio recorded.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

Risks are minimal for involvement in this study. However, you may feel emotionally uneasy when asked to make judgments based on the questions provided. You may choose to skip questions.

WILL YOU BENEFIT FROM TAKING PART IN THIS STUDY?

You will not gain any personal benefit from taking part in this study. However, it is hoped that through your participation, researchers will learn more about strategies to address food insecurity in rural communities.

WHAT WILL IT COST YOU TO PARTICIPATE?

There are no costs associated with taking part in this study.

WHO WILL SEE THE INFORMATION THAT YOU GIVE?

When we write about or share the results from the study, we will write about the information combined from all the study participants. We will keep your name and other identifying information private.

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. We will only identify you with a unique identifier during the collection of data. After the data collection is complete, all potential identifiers will be erased, including your contact information provided for scheduling the in-depth interviews.

You should know that there are some circumstances in which we may have to show your information to other people. For example, the law may require us to share your information with authorities if you report information about a child being abused or if you pose a danger to yourself or someone else.

CAN YOU CHOOSE TO WITHDRAW FROM THE STUDY EARLY?

You can choose to leave the study at any time. You will not be treated differently if you decide to stop taking part in the study.

If you choose to leave the study early, data collected until that point will remain in the study database and may not be removed.

WILL YOU RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

You will receive a $75 gift card for participating in the interview. You must complete the interview to receive the gift card.

WHAT ELSE DO YOU NEED TO KNOW?

If you volunteer to take part in this study, you will be one of about 30 people to do so.

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INFORMED CONSENT SIGNATURE PAGE

I have read and understood the consent form and desire of my own free will to participate in this study.
My signature below indicates my consent to participate in this study.

_____ _____
Signature of research subject **Date**

_____
Printed name of research subject

_____ _____
Printed name of [authorized] person obtaining informed consent Date

_____
Signature of Principal Investigator or Sub/Co-Investigator

Appendix D: Cultural Competence Survey

COMMUNITY HEALTH WORKER SURVEY

Cultural Competence Survey – VALIDATED QUESTIONNAIRE

1) In the past 12 months, which of the following racial/ethnic groups have you encountered among your clients and their families or within the health care environment or workplace? *Mark 'X' for all that apply.*

- ❑ Hispanic/Latino (including Mexican, Mexican American, Chicano, Puerto Rican, Cuban, other Spanish)
- ❑ White/Caucasian/European American
- ❑ Black/African American
- ❑ American Indian/Alaska Native
- ❑ Asian (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, or other Asian)
- ❑ Native Hawaiian/Pacific Islander
- ❑ Arab American/Middle eastern
- ❑ Other (specify) _____

2) In your current environment what percentage of the total population is made up of people from these racial/ethnic groups? *Write in percents to add to 100%*

____ Hispanic/Latino (including Mexican, Mexican American, Chicano, Puerto Rican, Cuban, other Spanish)
____ White/Caucasian/European American
____ Black/African American
____ American Indian/Alaska Native
____ Asian (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, or other Asian)
____ Native Hawaiian/Pacific Islander
____ Arab American/Middle Eastern
____ All other groups combined
100 % = TOTAL

3) In the past 12 months which of the following special population groups have you encountered among your clients and their families or within the health care environment or workplace? *Mark 'X' for all that apply.*

- ❑ Mentally or emotionally Ill
- ❑ Physically Challenged/Disabled
- ❑ Homeless/Housing Insecure
- ❑ Substance Abusers/Alcoholics
- ❑ Gay, Lesbian, Bisexual, or Transgender
- ❑ Different religious/spiritual backgrounds
- ❑ Other (specify) _____

4) In your current environment what percentage of the total population is made up of people from these special population groups? *Write in percents; may not total 100%*

____ Mentally or emotionally Ill
____ Physically Challenged/Disabled
____ Homeless/Housing Insecure
____ Substance Abusers/Alcoholics
____ Gay, Lesbian, Bisexual, or Transgender
____ Different religious/spiritual backgrounds

COMMUNITY HEALTH WORKER SURVEY

5) Overall, how competent do you feel working with people who are from cultures different than your own?

Very competent	Somewhat competent	Neither competent nor incompetent	Somewhat Incompetent	Very Incompetent
❑	❑	❑	❑	❑

For each of the following statements, put an 'X' in the box that best describes how you feel about the statement.

6) Race is the most important factor in determining a person's culture.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

7) People with a common cultural background think and act alike.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

8) Many aspects of culture influence health and health care.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

9) Aspects of cultural diversity need to be assessed for each individual, group, and organization.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

10) If I know about a person's culture, I don't need to assess their personal preferences for health services.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

11) Spiritual and religious beliefs are important aspects of many cultural groups.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

12) Individual people may identify with more than one cultural group.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

13) Language barriers are the only difficulties for recent immigrants to the United Sates.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

COMMUNITY HEALTH WORKER SURVEY

14) I believe that everyone should be treated with respect regardless of their cultural heritage.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

15) I understand that people from different cultures may define the concept of "health care" in different ways.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

16) I think that knowing about different cultural groups helps direct my work with individuals, families, groups, and organizations.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

For each of the following statements put 'X' in the box that best describes how often you do the following:

17) When I do individual or organizational evaluations, I include cultural considerations.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

18) I seek information on cultural needs when I identify new people in my work or school.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

19) I have resource books and other materials available to help me learn about people from different cultures.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

20) I use a variety of sources to learn about the cultural heritage of other people.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

21) I ask people to tell me about their own explanations of health and illness.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

22) I ask people to tell me about their expectations for health services.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

COMMUNITY HEALTH WORKER SURVEY

23) I avoid using generalizations to stereotype groups of people.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

24) I recognize potential barriers to service that might be encountered by different people.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

25) I try to remove obstacles for patients of different cultures when I identify barriers to services.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

26) I remove obstacles for people of different cultures when people identify barriers to me.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

27) I welcome feedback from clients about how I relate to people from different cultures.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

28) I find ways to adapt my services to individual and group cultural preferences.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

29) I document cultural assessments if I provide direct client services.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

30) I document the adaptations I make with clients if I provide direct client services.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

Childhood Socioeconomic Status – validated survey

31) My family had enough money for things growing up.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

32) I grew up in a relatively wealthy neighborhood

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion
❑	❑	❑	❑	❑	❑	❑	❑

33) I felt relatively wealthy compared to others my age.

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree	No Opinion

COMMUNITY HEALTH WORKER SURVEY

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

NEW QUESTIONS (Adapted from prior surveys)

34) How long have you worked as a Community Health Worker or similar role (Health Advocate, Outreach Educator, health paraprofessional, etc)?
A less than 1 year
B 1 – 3 years
C 4 – 7 years
D 8 – 10 years
E more than 10 years

35) How long have you been in your current job?
A less than 1 year
B 1 – 2 years
C 3 – 4 years
D more than 5 years

45. How many different 'Community Health Worker' jobs have you had?
A. 1
B. 2
C. 3
D. 4
E. 5 or more

36) What activities do you currently do as a Community Health Worker? (circle all that apply)
a) health education/information and
b) health assessments
c) make referrals
d) case management
e) home visits for counseling
f) support groups
g) health screenings
h) case finding/recruitment
i) office work
j) clinical services
k) translation/interpretation
l) teach classes
m) provide transportation to clients
n) health fairs
o) community organizing
p) collaborating with other agencies
q) follow up to referrals
r) peer education/mentoring
s) fundraising/grant writing
t) presenting in schools, community centers, etc.
u) enrollment (Medicare, Medicaid, Kentucky medical program, insurance, etc)
v) Other, specify: _____.

37) Do you have another paid job besides being a Community Health Worker?
A No
B Yes
If Yes please describe: _____

38) In the last 12 months, I worried whether my food would run out before I got money to buy more.
❑ Often True
❑ Sometimes True
❑ Never True
❑ Don't Know or Refuse

39) In the last 12 months, the food I bought just didn't last, and I didn't have money to get more.

- ❑ Often True
- ❑ Sometimes True
- ❑ Never True
- ❑ Don't Know or Refuse

FOOD ASSISTANCE PROGRAMS: Select the option that best describes your level of knowledge to refer families to following food assistance programs.

40) I am able to provide guidance to families to obtain access to **Supplement Nutrition Assistance Program** (SNAP), formerly known as food stamps.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

41) I am able to provide guidance to families to obtain access to **Farmers market vouchers**.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

42) I am able to provide guidance to families to obtain access to **mobile farmers market**.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

43) I am able to provide guidance to families to obtain access to **Food bank boxes**.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

44) I am able to provide guidance to families to obtain access to **church pantry food boxes**.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

45) I am able to provide guidance to families to obtain access to **summer feeding programs** for children.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

46) I am able to provide guidance to families to obtain access to **garden seed program**.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

47) I am able to provide guidance to families to obtain access to **community gardens**.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

COMMUNITY HEALTH WORKER SURVEY

48) I am able to provide guidance to families to obtain access to **other food assistance**. Please specify_____.

Always	Very Often	Somewhat Often	Often	Sometimes	Few Times	Never	Not sure
❑	❑	❑	❑	❑	❑	❑	❑

SLEEP ASSESSMENT QUESTIONS

49) Do your clients complain about the amount of sleep or quality of sleep they get?

- ❑ No
- ❑ Yes

50) Do your clients complain about the amount of sleep or quality of sleep their children get?

- ❑ No
- ❑ Yes

51) Do you ever talk to your clients about smoking in the home?

- ❑ No
- ❑ Yes

52) Do you know if your clients are taking medication to help them sleep?

- ❑ No
- ❑ Yes

53) Do you think your clients know the importance of sleep for good health?

- ❑ No
- ❑ Yes

54) Do you ever talk about SIDS prevention with parents of newborns?

- ❑ No
- ❑ Yes

55) Do your clients have access to reliable electricity in the home?

- ❑ No
- ❑ Yes

COMMUNITY HEALTH WORKER SURVEY – PART II – training and experience

56) Have you ever participated in cultural diversity training that was not required for your employment?

- ❑ No
- ❑ Yes

57) If you have had prior diversity training, which option below best describes it?
(Check all that apply)

- ❑ Separate college course for credit
- ❑ Content covered in a college course
- ❑ Professional Conference or Seminar
- ❑ Employer Sponsored Program
- ❑ On-line (computer assisted) Education
- ❑ Continuing Education Offering
- ❑ Other diversity training types (Specify) _____

58) Which population(s) of people do you encounter during your work that do not have resources? (circle all that apply)

a. Men
b. Women
c. Adolescents
d. Children under 5
e. Children between 5-11
f. Elderly
g. Pregnant women/New parents
h. Hispanics
i. African Americans
j. Others, specify: _____
k. Gay/Lesbian/Bisexual
l. Other, specify: _____

59) Among the population(s) of people you selected, which do you believe has the most urgent needs? (circle only 1)

a. Men
b. Women
c. Adolescents
d. Children under 5
e. Children between 5-11
f. Elderly
g. Pregnant women/New parents
h. Hispanics
i. African Americans
j. Others, specify: _____
k. Gay/Lesbian/Bisexual
l. Other, specify: _____

60) Which of the following are health concerns among the people you serve? Check all that apply.

a. Type 2 diabetes
b. Hypertension/high blood pressure
c. High cholesterol
d. Heart disease
e. Mental health
f. Elicit addiction/abuse
g. Prescription drug addiction/abuse
h. Tobacco cessation
i. Hunger
j. Basic Nutrition Education
k. Other:_____

Client/patient Perceptions

61) The area where my clients reside would be classified as a food desert.

- ❑ Strongly disagree
- ❑ Disagree
- ❑ Neutral
- ❑ Agree
- ❑ Strongly agree

There is a negative stigma associated with visiting the food pantry in the areas my clients reside.

- ❑ Strongly disagree
- ❑ Disagree
- ❑ Neutral
- ❑ Agree
- ❑ Strongly agree

62) The stigma associated with visiting the food pantry prevents my clients from using it to obtain food.

- ❑ Strongly disagree
- ❑ Disagree
- ❑ Neutral
- ❑ Agree
- ❑ Strongly agree

63) The environment where my clients reside promotes physical activity.

- ❑ Strongly disagree
- ❑ Disagree
- ❑ Neutral
- ❑ Agree
- ❑ Strongly agree

64) The clients I serve have access to physical activity opportunities where they reside.

- ❑ Strongly disagree
- ❑ Disagree
- ❑ Neutral
- ❑ Agree
- ❑ Strongly agree

65) The clients I serve have access to mental health services.

- ❑ Strongly disagree
- ❑ Disagree
- ❑ Neutral
- ❑ Agree
- ❑ Strongly agree

COMMUNITY HEALTH WORKER SURVEY

Demographics

66) Using the categories below, what do you consider yourself? *(Choose one or more)*

- ❑ Hispanic/Latino (including Mexican, Mexican American, Chicano, Puerto Rican, Cuban, other Spanish)
- ❑ White/Caucasian/European American
- ❑ Black/African American
- ❑ American Indian/Alaska Native
- ❑ Asian (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, or other Asian)
- ❑ Native Hawaiian/Pacific Islander
- ❑ Arab American/Middle eastern
- ❑ Other (specify) _____

67) What is your highest level of education completed?

- ❑ Less than high school
- ❑ Diploma
- ❑ High school or GED
- ❑ Associate degree
- ❑ Bachelors degree
- ❑ Graduate or professional degree

68) Where did you grow up? (city and state) _____

69) In what year were you born? _____

Thank you for taking this survey. We appreciate your time and effort!

Appendix E: In-Depth Cognitive Interview Guide for Community Health Workers

In-depth Cognitive Interview Guide

Thank you for meeting with me today to answer these very important questions.
First we will collect a unique identifier from you:
What are the first two letters of your Mother's maiden last name ___ (example: Grace, GR)
What are the first two letters of your Father's first name ___ (example: Paul, PA)
What are the last two digits of your street number ___ (example: 3456 Maple Dr., 34)
What are the two digits of your day of birth ___ (example: 12/25/75, 25)

I will begin recording your answers. Please feel free to stop me if you have any questions or need further clarification. When possible, please provide us with examples that will help us better understand your response.

Rural Health Nutrition Care Model Framework	**Corresponding In-depth Questions**
1. Access and Resources (finances, location/distance/food insecurity)	Among the families you help, what does hunger look like? Prompt: You can use an example of a family to describe how hunger affects the family as a whole or each individual member.
	What are some examples of challenges you face when trying to address hunger with families? Prompt: Are there some examples from families who you were not able to help and why were you not able to help them?
	When a family is in need of food, what are some ways that their family, friends or neighbors help?
	When a family is in need of food, what are some resources to obtain foods?
	Are healthy products available and affordable in our community? (Jernigan 2011)
	Can we affordably and efficiently get to where we need to be? (Jernigan 2011)
	Can I safely drink the water and breathe the air in my neighborhood? (Jernigan 2011)
	Tell us about your experience in providing services related to food and nutrition for clients. (Gutschall 2018)
	What if any barriers can you identify regarding providing food and nutrition for your clients? (Gutschall 2018)
	What issues impact the delivery of food and nutrition to your clients? (Gutschall 2018)
	Describe lessons you have learned about delivering food and nutrition to your clients. (Gutschall 2018)
	What influences the food choices of your clients? (Gutschall 2018)

2. Sociocultural Characteristics (Resistance to change, religion, family, storytelling)	Do people know and trust each other? (Jernigan 2011)
	What other positions, volunteer or paid, have you held that have helped you as a CHW [or program assistant]? Prompt: these positions can be through your church, children's schools,
	Can you give me an example of something that you learned in the role as [participant stated] that helps you in your current role?
	What do you think is unique about providing nutrition and food services to people living in Appalachia? (Gutschall 2018)
	What are some major nutrition and food service concerns that you see among your clients? (Gutschall 2018)
3. Traditional Foods (Familiar foods, dietary patterns and pathways, family meals)	What does hunger look like in your community?
	Where do people obtain most of their food? (Prompt: in town, out of town, specific shop in neighborhoods, etc.)
	Have you noticed if people in your community have gardens where they live? What types of foods/plants do people garden?
	What does a typical meal for a family look like? Who prepares the meal, who eats that meal and where is it eaten?
	What is an example of a solution to hunger or food insecurity that you have seen your clients use to solve their own or other's?
	What is an example of a solution to any issue that you have seen your clients use to solve their own or other's issue?
	What is an example of how your clients have overcome a major barrier? (Related to food, education, employment, healthcare, etc.)
4. Health Behaviors (Preventative care, substance abuse, self-management, chronic disease)	Who does most of the cooking for your clients? If themselves, Prompt: Who do your clients cook for?
	What skills, knowledge or techniques do you believe you clients would benefit from learning or practicing to reduce food insecurity and hunger?

	What other health problems make food insecurity and hunger worse?
	What health problems does food insecurity and hunger make worse?
	What is an example of a change that a client or family has made to improve their access to foods?
	What individuals are most knowledgeable about food insecurity and hunger in the community?
	What individuals do your clients trust the most to talk to about food insecurity and hunger?

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